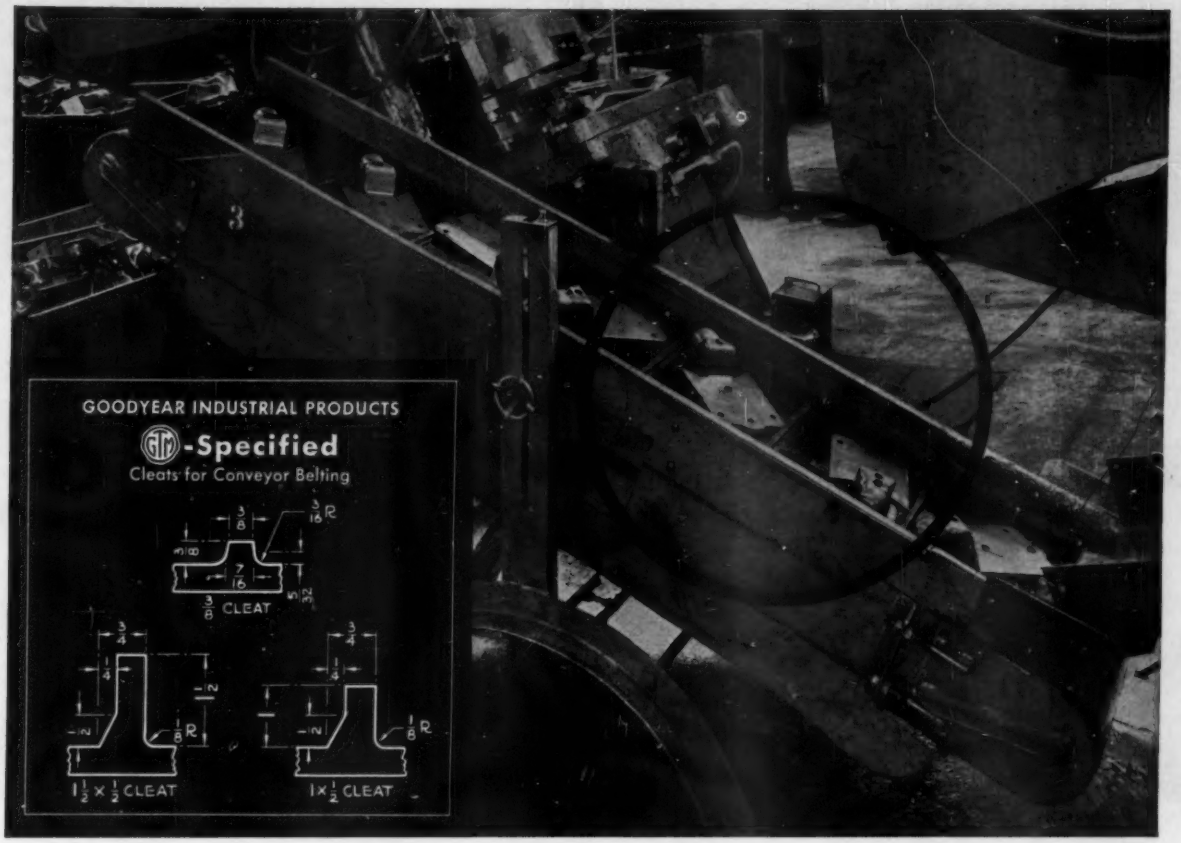

They're raising production—and lowering costs by ⅓

Portable conveyors—between production lines on different levels—were a "must" at this Midwestern automotive parts plant. But the specially constructed belts they used soon cut and flaked off. They became oil-soaked and accumulated dust—dirtying the parts. Worse still, they stretched—had to be taken up every 6 weeks. Even then, none lasted more than a year.

Then the G.T.M.—Goodyear Technical Man—recommended Style ORS Cleated Belts. They're made of rubber especially compounded for extreme resistance to oil, cutting and abrasion. And the tough, firm-gripping cleats are molded right into the rubber for durability.

The savings are impressive: The G.T.M.'s less-expensive belts eliminated the need for parts washing. And after 3 straight years of full service—*three times the life of competitive belts*—they're still going strong.

Like to have savings like these on your production lines? The fastest way to find out is to call the G.T.M. He'll be Johnny-on-the-spot if you contact your Goodyear Distributor—or write Goodyear, Industrial Products Division, Akron 16, Ohio.

• • •

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

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'ROUND ABOUT

with the editors in field and office

Edited by R. L. Marinello

Construction Forecasts for 1959

AT A RECENT meeting of the National Lumber Manufacturers Association in Washington, D. C., E. W. Magee, Jr., Associate Economist, with F. W. Dodge Corporation, commented on the potential construction market for 1959.

He mentioned that the total construction contracts (residential and non-residential building and heavy engineering projects) in the United States will amount to $35,570,000,000 in 1959. This is an increase of three per cent over last year's estimates.

Based on the survey Dodge conducted, non-residential building contracts are estimated to increase five per cent in 1959. They expect commercial buildings to be up three per cent; and manufacturing buildings to be up as much as 14 per cent.

Total non-residential building contracts in 1959, in terms of square footage—or physical volume—are estimated to be four per cent above the 1958 level.

Arc Welding Contest

IF YOU OR any of the men in your department have solved a plant problem employing the arc welding process, you will be interested in the contest being conducted by The James F. Lincoln Arc Welding Foundation.

The Machine Design Award Program offers 54 awards, totaling $50,000, for the best papers describing the use and advantages of arc welding in the design and construction of a machine or machine component. All papers must be mailed on or before July 20, 1959.

Rules and regulations may be obtained by addressing your inquiry to: Secretary, The James F. Lincoln Arc Welding Foundation, P. O. Box 3035, Cleveland 17, Ohio.

Materials Handling Work Course

MATERIALS HANDLING planners who are looking for the latest in techniques and procedures may find them at the second annual Midwest Work Course on Materials Handling Analysis. The intensive five-day study program will be held in Kansas City, Kansas, starting on February 2, at the University of Kansas Extension Center.

Such subjects as Isolating the Problem, Fact-gathering Techniques, Integrating Handling and Processing, Materials Handling Survey and many others will be discussed during the five-day program.

For full details and a registration blank, write to Edward S. Avison, University of Kansas Extension Center, 39th and Rainbow Blvd., Kansas City 12, Kansas.

Appointment at A. M. Byers Co.

Edward A. Turner has been appointed maintenance superintendent at the Ambridge, Pa., plant of A. M. Byers Company.

He was formerly maintenance superintendent with the Vanadium Corporation of America and mechanical maintenance engineer with Carborundum Company of Niagara, N. Y. He is a graduate of the University of Toronto with a B.A. in electrical engineering.

February Conferences

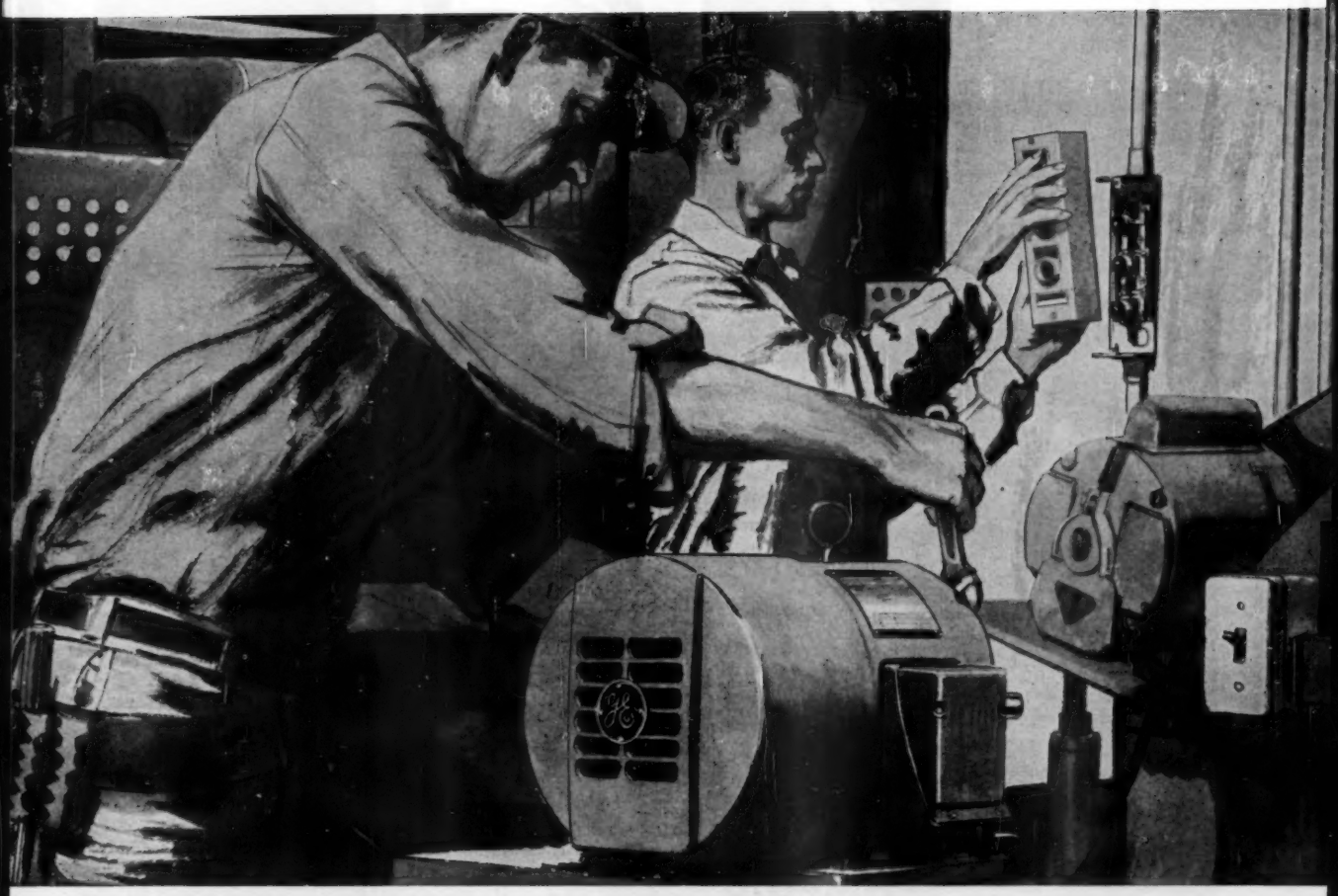
PLANNED HANDLING for Progress and Profits is the theme of the conference program to run concurrently with the Materials Handling Exposition. The dates are February 2 through the 6; and the place: the Automotive Building Exhibition Park, Toronto, Ontario, Canada.

Further information may be obtained by writing to Materials Handling in Canadian Industry, 2 Bloor Street East, Toronto, Canada.

The Industrial Ventilation Conference will be held at Kellogg Center, Michigan State University, from February 16 through the 19. Conference will consist of informal lectures and workshop sessions on such subjects as air flow fundamentals, testing of exhaust systems, fan selection and application, collection performance and make-up air applications.

For further information and regis-

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.



Exactly the right G-E Tri/Clad motor in type, speed and power for every drive job is ready for you through any Graybar location. Through this same convenient source you can get experienced help in picking the right controls. To insure perfect selection you don't need to know all about all controls. Just know — and use — the phone number of your nearest Graybar office.

How to pick the one best GE MOTOR and CONTROL for any power drive in your plant

In a single department your plant may have several different motor problems. High starting torque may be needed in one case, constant speed in another. And many times, motors have to work dependably in dusty, dirty air. For each job, and for every other motor drive need, there is one best G-E Tri/Clad motor to do the work with complete satisfaction. And matching control. For precise selection and prompt, friendly help you or your electrical contractor can rely on Graybar.

Through more than 130 Graybar offices and warehouses you have conveniently available motors, controls and over 100,000 electrical items. Further, Graybar Specialists, strategically located throughout the United States, are ready and willing to give you or your electrical contractor the full benefit of their broad experience in motors, control, wiring, lighting, ventilation, electronics and communication. When you need help or advice, scheduled or emergency shipments on *anything electrical*, always CALL GRAYBAR FIRST.

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These two bulletins give you valuable help in the selection of motors and controls for specific jobs. Send now for your copies.

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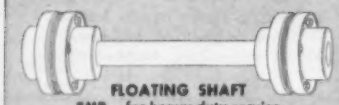

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6 No Lubrication
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'ROUND ABOUT

tration blank, address your inquiry to: Eighth Annual Industrial Ventilation Conference, Continuing Education Service, Michigan State University, East Lansing, Michigan.

Morgan Named Plant Engineer

Victor M. Morgan has been named plant engineer of the Columbia, Tenn., plant of the Phosphorus Division, Hooker Chemical Corporation.

Formerly an area engineer at Hooker's Niagara Falls, N. Y., plant since November 1957, he joined the company in 1950 as a chemical engineer. He was named maintenance engineer in January 1953, sales production coordinator in June of that year, and chemical salesman in the Chicago District in 1954. He returned to the operations department at the Niagara Falls plant in July 1956.

The Older the Better

IF YOU HAVE any real old electrical equipment in your plant which is either still in use or stored away somewhere in one of the back rooms, the Electrical Historial Foundation is interested in hearing about it.

They are making an inventory of electrical equipment in storage or still in use. The foundation is also collecting and reconditioning all such electrical equipment for use in an all electric museum of the future.

Should you have any of this equipment in your plant, send the information to the Electrical Historial Foundation, Box 93, Newfane, Vermont.

Editor Visits New Office Lighting Room at Nela Park

WILL S. FISHER, Office Lighting Specialist, explains some of the features of the new office lighting demonstration room at the General Electric Lighting Institute, Nela Park, Cleveland, Ohio, to PLANT ENGINEERING's Electrical Editor, Vern Kempf.

Office lighting levels up to 1000 ft-c can be obtained in this room with comfortable seeing conditions. A system of exhausting 25 per cent of the air in the room through the fixtures removes a large proportion of the fixture heat before it affects the air conditioning load. In the summer months, this air is exhausted to the outside and is replaced by normal fresh air required. In the winter, the heated air may be recirculated to assist in heating the area.

According to G. E. engineers, this system reduces air conditioning load at a lighting level of 200 ft-c to the same amount formerly required in an office with 100 ft-c of illumination.

Vern Kempf, left, discusses features of new lighting room with Will S. Fisher.

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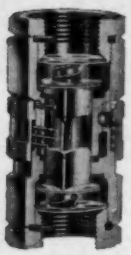
QUICK-DISCONNECT COUPLINGS

in larger sizes

immediate delivery

FROM FACTORY STOCKS

Snap-Tite's "H" Couplings are now factory-stocked for quick shipment to you, not only in the smaller sizes (below 1" ID) but in all sizes up to and including 3"—in steel, brass, aluminum, and 303 and 316 Stainless Steel. And "H" Couplings can be made to your order, up to 10" ID.



Available with valves to give two-way or one-way automatic line shut-off, or without valves for straight-thru flow, "H" Couplings are built to handle high pressures in hydraulic and air systems.

Recessed valve washers . . . fluted valve stems . . . valve stops with minimum flow restrictions . . . large inside diameter—allow maximum flow capacity with lowest pressure drop.

See the Snap-Tite representative in your city or write for Bulletin 240.

SNAP-TITE'S "H" COUPLING, SIZE FOR SIZE, IS THE SMALLEST COUPLING WITH HIGHEST STRENGTH AND HIGHER EFFICIENCY

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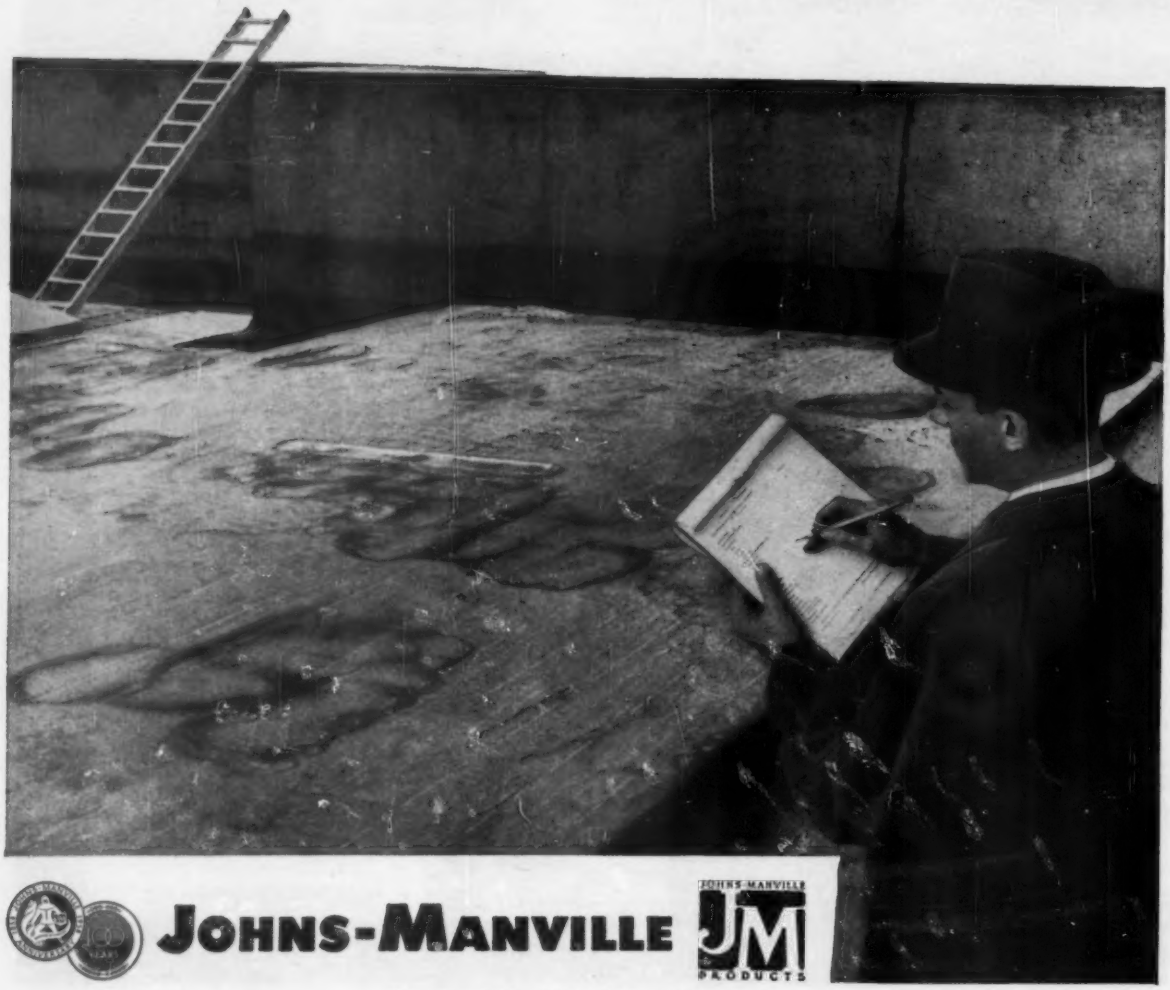
Johns-Manville Roof Survey helps protect your buildings

• You can forestall roof defects that may result in costly damage by having your built-up roof inspected by an expert. And your J-M Roofing Contractor is the man to do it.

Using the Johns-Manville Roof Survey Plan, he will give you an accurate picture of all the critical areas of your roof. This detailed report covers the conditions of flashings, deck, roofing felts, parapet walls, skylights, ventilators . . . everything on your roof that has a bearing on its ability to keep out the weather. It will enable you to make plans now for repairs and maintenance in the future.

To take advantage of this free roof survey, just call your J-M Roofing Contractor. He is listed in the Classified Telephone Directory.

In the meantime, let us send you a copy of the information packed booklet "Things You Should Know About Your Roof." It contains the full story about the J-M Roof Survey Plan. Write to: Johns-Manville, Box 158, New York 16, N. Y. In Canada, write Port Credit, Ontario.



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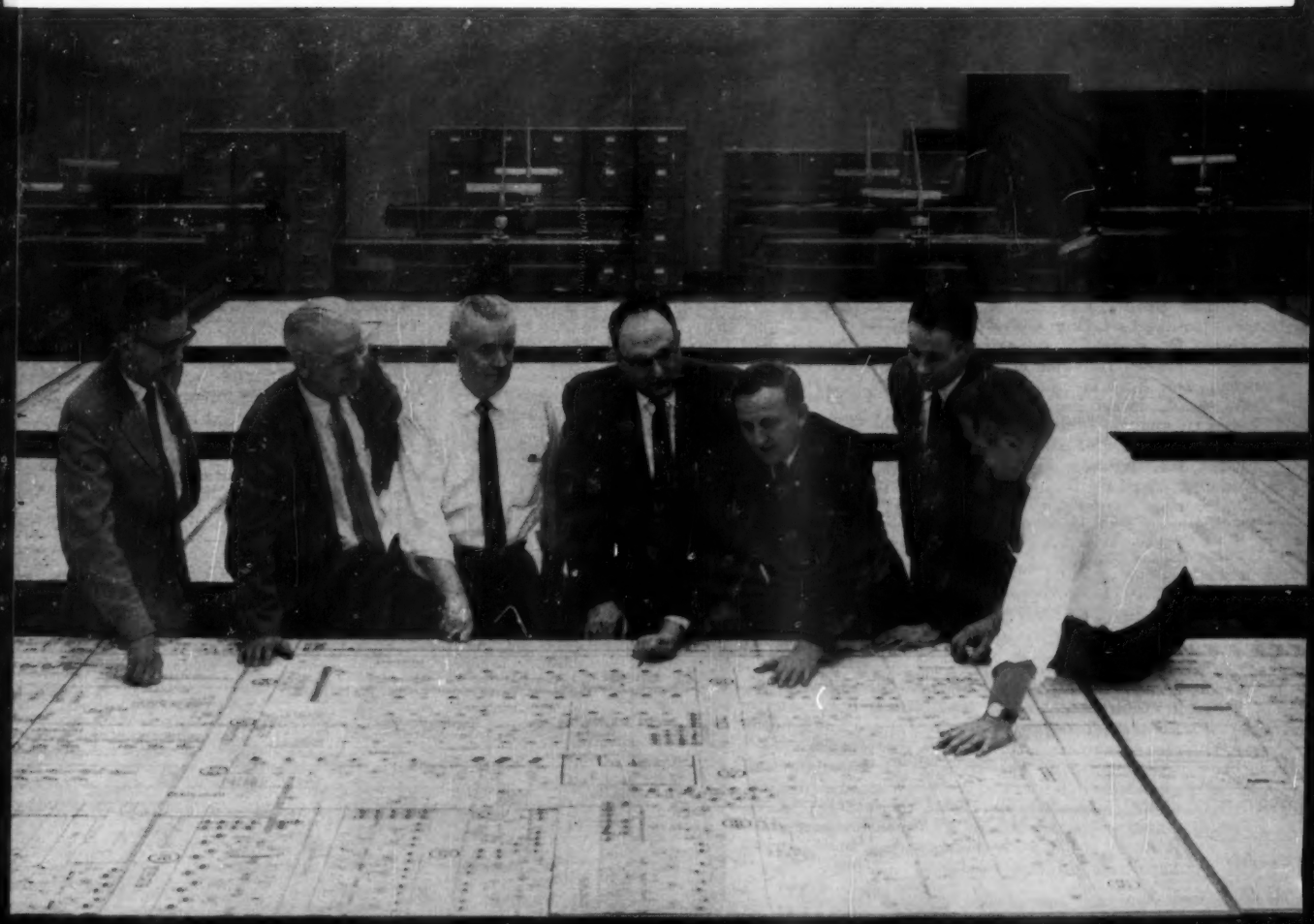


Westinghouse electrical system specified to Power-Up Ford products plant

YOU CAN BE SURE...IF IT'S Westinghouse

COVER PHOTO: Assembled in the plant layout room of the Ford Motor Co., General Products Division Plant, Indianapolis, Ind., are: Melvin Wetterlin, Westinghouse Sales Engineer, J. Vance Garinger, Project Engineer, Hatfield Electric Co., Inc., Electrical Contractors; S. V. Cornforth, Maintenance Engineer, Plant Engineering Department, Ford, Indianapolis; D. A. Kerry, Supervisor, Ford General Products Division Staff, Dearborn, Michigan; H. P. Jones, Manager, Plant Engineering Department, Ford, Indianapolis; James Miller, Westinghouse Construction Sales Engineer; and R. Richards, Supervisor, Engineering Planning, Plant Engineering Department, Ford, Indianapolis.

Melvin Wetterlin, J. Vance Garinger, and J. Rodriquez, Power and Waste Supervisor, Plant Engineering Department, Ford, Indianapolis, look overhead to identify the Westinghouse 45-kva DT-3 dry-type transformer, Westinghouse aluminum bus duct and Westinghouse fluorescent and high-bay lighting. Westinghouse NLAB-LX column-type panelboard, shown with trough and pullbox, is fed from the secondary of the dry-type transformer above.

Main entrance to Steering Gear and Cold Heading Plant, General Products Division, Ford Motor Company, Indianapolis, Indiana. Westinghouse electrical distribution system is used to meet present electrical needs, provide the necessary flexibility to permit extensive rearrangement of production machinery whenever required and to assure maximum facility in expanding to satisfy all future demands.

J-94104-2

Ford plant planning anticipates future power needs

The Ford Motor Company plant in Indianapolis, Indiana, where these pictures were taken, occupies more than 1,400,000 square feet of floor area. It requires a constant power supply of 26,500-kva. The combination of great size, large capacity and exacting, but frequently varying, production schedules makes it imperative that plant engineering must go beyond careful control of everyday operation. Planning for future demands becomes equally important.

Westinghouse, working with architects, consulting engineers, general contractors, electrical contractors and Ford engineers, had an active part in equipping this plant with the electrical distribution system and with other electrical components required to assure uninterrupted operation and provide for anticipated expansion. For example, 144 Westinghouse dry-type transformers of various ratings are mounted at heights varying from 22 to 45 feet above floor level, above conveyor trusses. The light weight, ease of installation and minimum maintenance requirements of these dry-type transformers have made it possible to locate them so each provides the required voltage, with minimum loss, to the equipment it supplies.

Over 6000 Westinghouse high-bay mercury vapor fixtures give daylight-type lighting in production areas, and these are supplemented by Westinghouse fluorescent lighting for the general illumination required by nighttime clean-up workers.

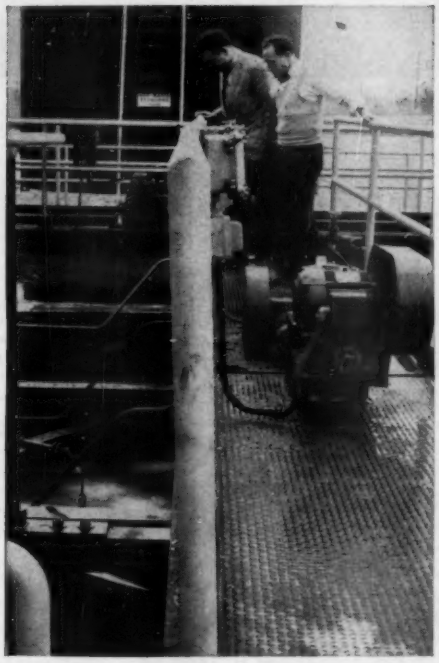
Approximately 2½ miles of Westinghouse 600-amp, 480-v, 3-pole, aluminum plug-in bus duct, mounted in 17 parallel straight runs (shown as

(continued)

J-94104-3

YOU CAN BE SURE...IF IT'S Westinghouse

J. Rodriquez checks substation meter to make certain power factor constant at 98% lag is being maintained throughout the plant. This extreme efficiency of the electrical system is made possible by the use of Westinghouse capacitors.



J. Rodriquez and W. D. Eason, Engineer, Waste Treatment Plant, Plant Engineering Department, stand beside Westinghouse 7.5-hp totally enclosed Life-Line® "A" motor which drives the waste oil recovery tank agitator.

Shown between Lloyd L. Williams, Branch Mgr., WESCO, Indianapolis, and Paul E. Butalla, Main. Supvr., Plant Engin. Dept., Ford, Indianapolis, is Westinghouse Slipsyn® synchronous motor starter providing automatic starting and field application control for Westinghouse 400-hp, 440-volt motor.

J. Vance Garinger, Lloyd Williams, C. E. Hamm, Sales Rep., WESCO, Indianapolis, and J. Rodriquez shown before one of the nine power centers which distribute the 26,500-kva load throughout the plant. Power centers have stand-by circuit breakers and blank cubicles equipped for future needs.

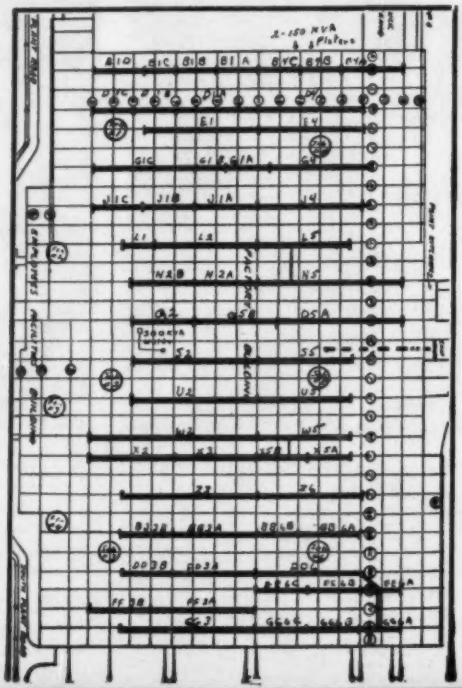
Ford plant planning anticipates future needs *(continued)*

heavy black lines in diagram), have been installed to provide maximum flexibility in locating production machinery.

Westinghouse can help you with any phase of your electrical planning and construction. See your Westinghouse distributor, or write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

Ford Motor Company
Steering Gear and Cold Heading Plant
General Products Division
Indianapolis, Indiana

Architect-Engineers: Smith, Hinchman and Grylls Associates, Inc.
Consulting Engineers: (Waste Treatment Plant) Hubbell, Roth & Clark, Inc.
General Contractors: Cunningham-Limp Co., Inc.
Electrical Contractors: Hatfield Electric Co., Inc.
Westinghouse Distributor: Westinghouse Electric Supply Co., Indianapolis, Indiana



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Over 250 Pages Westinghouse Data in Sweet's Construction File (S)

J-94104-4

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CB&I TANKS

ON CORROSIVE SERVICE AT SOUTHERN NITROGEN

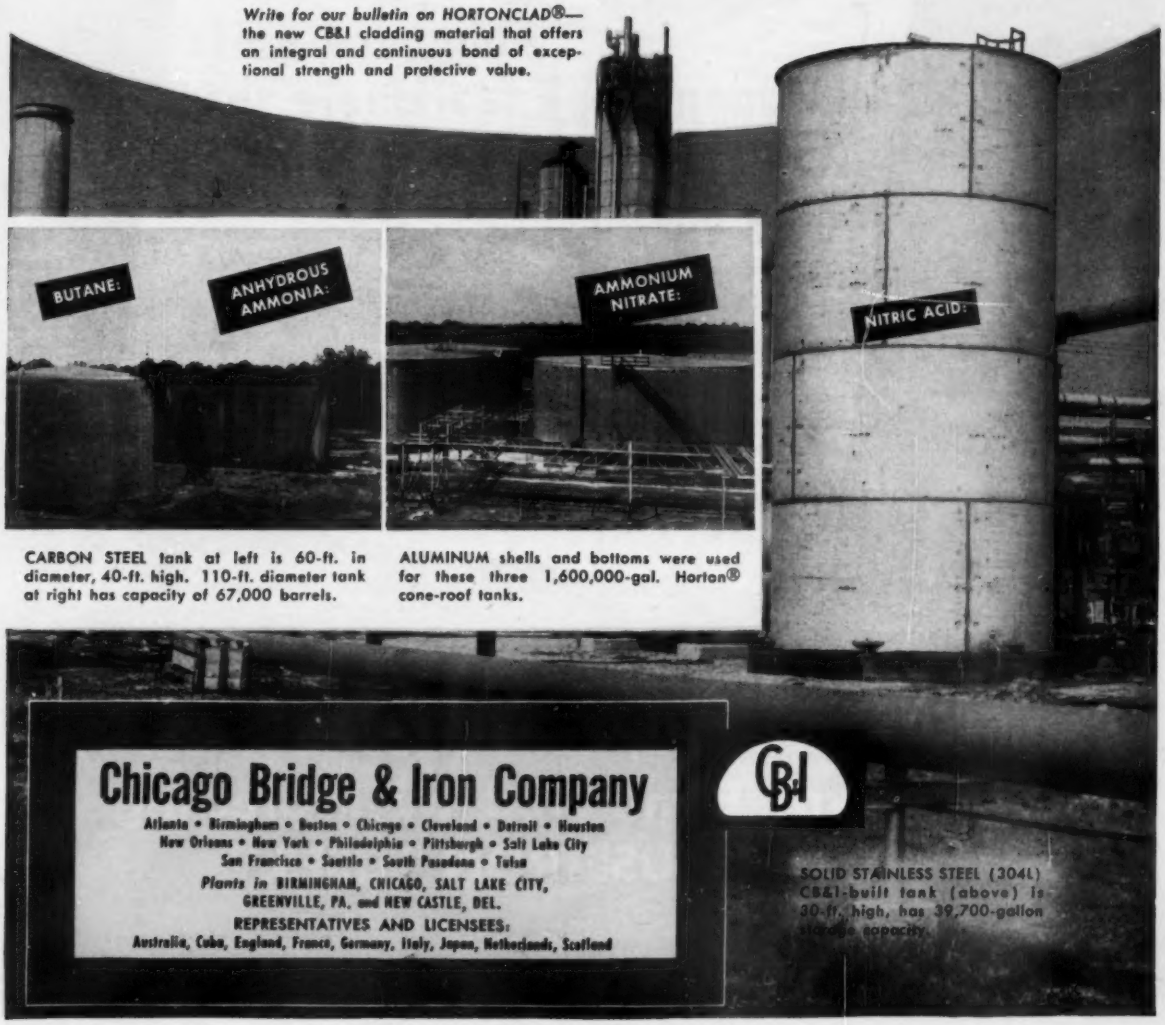
Special metals help prolong tank life at Southeast's first basic nitrogen plant.

Southern Nitrogen Company's $14,000,000 plant at Savannah, Georgia, is designed to provide southeastern states with a nearby, economical source for a full line of basic nitrogen products.

To insure maximum performance life for tanks used to store a variety of highly corrosive materials which are produced or handled in the plant processes, CB&I specialists worked closely with the Girdler Company (General Contractors) and Southern Nitrogen officials. Carbon steel, solid stainless steel, aluminum and other combinations of corrosion resistant metals and alloys were used.

The handling of special metals, including design of structure, fabrication and erection, is a specialty and an art with CB&I. As a result, the "little" engineering or structural refinements that mean a *lot* in overall plant performance—have become an integral part of any welded steel structure that is furnished by CB&I.

Write for our bulletin on HORTONCLAD®—the new CB&I cladding material that offers an integral and continuous bond of exceptional strength and protective value.



CARBON STEEL tank at left is 60-ft. in diameter, 40-ft. high. 110-ft. diameter tank at right has capacity of 67,000 barrels.

ALUMINUM shells and bottoms were used for these three 1,600,000-gal. Horton® cone-roof tanks.

SOLID STAINLESS STEEL (304L) CB&I-built tank (above) is 30-ft. high, has 39,700-gallon storage capacity.

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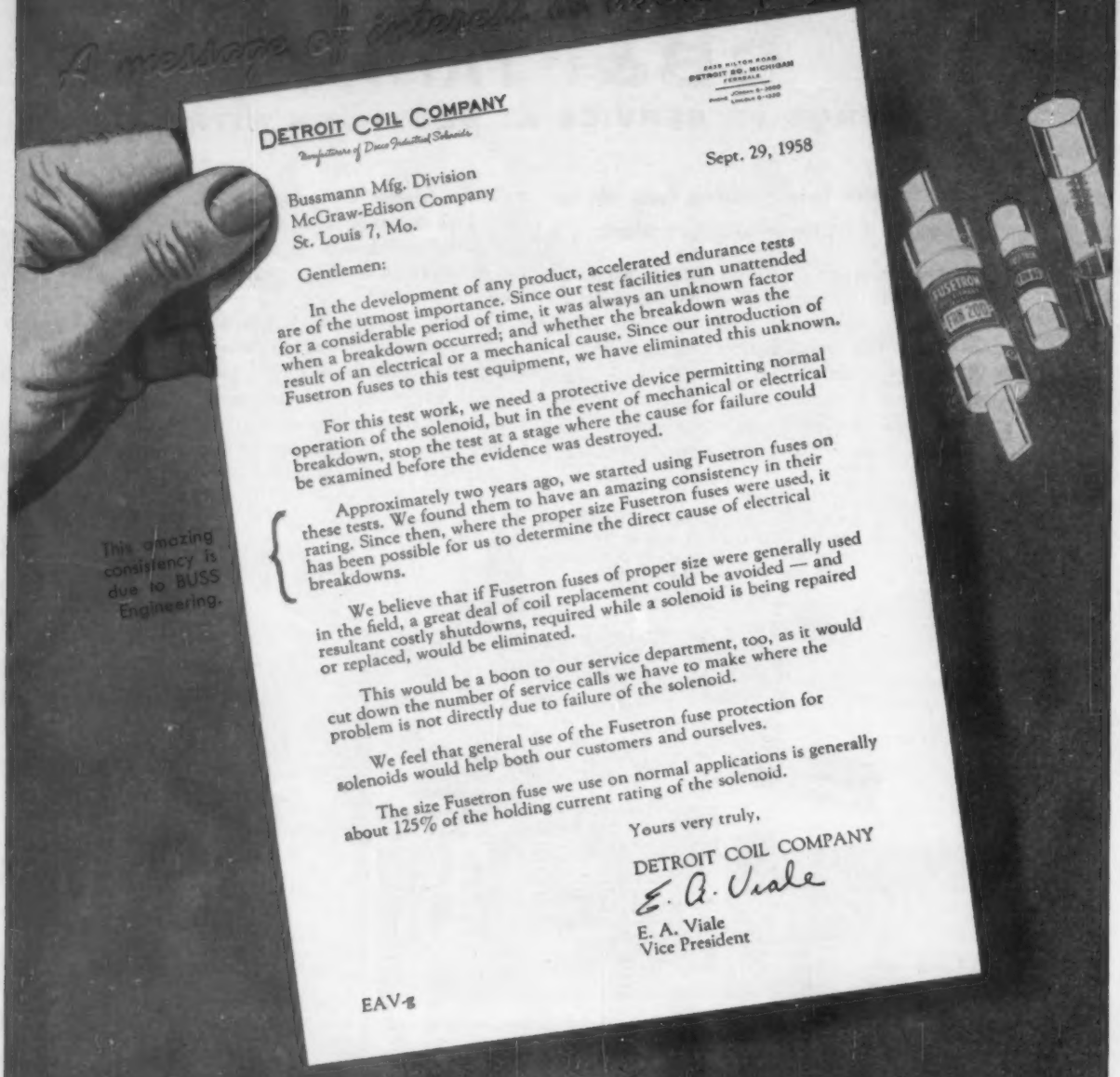
CB&I

A message of interest to users of Solenoids



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Manufacturers of Direct Industrial Solenoids

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DETROIT 32, MICHIGAN
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Phone: JOrdan 5-3000
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Sept. 29, 1958

Bussmann Mfg. Division
McGraw-Edison Company
St. Louis 7, Mo.

Gentlemen:

In the development of any product, accelerated endurance tests are of the utmost importance. Since our test facilities run unattended for a considerable period of time, it was always an unknown factor when a breakdown occurred; and whether the breakdown was the result of an electrical or a mechanical cause. Since our introduction of Fusetron fuses to this test equipment, we have eliminated this unknown.

For this test work, we need a protective device permitting normal operation of the solenoid, but in the event of mechanical or electrical breakdown, stop the test at a stage where the cause for failure could be examined before the evidence was destroyed.

Approximately two years ago, we started using Fusetron fuses on these tests. We found them to have an amazing consistency in their rating. Since then, where the proper size Fusetron fuses were used, it has been possible for us to determine the direct cause of electrical breakdowns.

We believe that if Fusetron fuses of proper size were generally used in the field, a great deal of coil replacement could be avoided — and resultant costly shutdowns, required while a solenoid is being repaired or replaced, would be eliminated.

This would be a boon to our service department, too, as it would cut down the number of service calls we have to make where the problem is not directly due to failure of the solenoid.

We feel that general use of the Fusetron fuse protection for solenoids would help both our customers and ourselves.

The size Fusetron fuse we use on normal applications is generally about 125% of the holding current rating of the solenoid.

Yours very truly,

DETROIT COIL COMPANY

E. A. Viale

E. A. Viale
Vice President

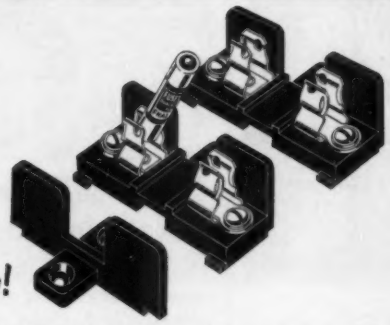
EAV-s

This amazing consistency is due to BUSS Engineering.

"A Great Deal of Coil Replacement could be avoided, and Resultant Costly Shutdowns Eliminated by Protecting Solenoids *with* FUSETRON FUSES."

E. A. Viale, VICE PRESIDENT
DETROIT COIL COMPANY

Protecting solenoids or other electrical equipment with FUSETRON Fuses—gives you greater safety, dependability and money-savings!



New!

The BUSS Add-On Fuse Block for the protection of solenoids or Small Motors on Multi-Circuit Equipment

The BUSS Add-On fuse block makes it easy to protect equipment of any kind where a number of solenoids or motors are used.

Blocks are made up of single pole fuse blocks that interlock into a unit fuse block of any number of poles.

Poles may be added or removed . . . to either end of assembled fuse block. This makes it simple to have a fuse block of just the number of poles needed and to fit the block to available space.

Each fuse can be used as a circuit disconnect.

Specially designed fuse clips permit one end of fuse to be removed from clip and fuse raised to right angle to block where it is held firmly in position — see picture above.

When working on machine this makes it quick to identify circuit that is open — and it assures that proper fuse will be put back in right circuit.

Write for BUSS Bulletin BL-1.

BUSS and FUSETRON fuses are available to fit these fuse blocks in ampere sizes up to 30 and for voltages up to 250. Write for BUSS Bulletin SFB.

FUSETRON dual-element fuses provide 10 point protection against electrical troubles—unlike circuit breakers or ordinary fuses which, except in rare cases, protect only against short-circuits.

Fusetron Fuses remain safe — with no maintenance or recalibration required. They are calibrated at the factory by engineers. Once properly installed, they require no inspection and resulting downtime necessary on mechanically operated devices. There are no hinges, pivots or contacts to stick or get out of order. Dust, corrosion or oxidation cannot increase a Fusetron fuse's capacity or lengthen its blowing time.

After years of inactivity, a Fusetron fuse will give the same safe, dependable protection if called upon to open as it would have on the day it was installed.

For more information, write for . . . Bulletin FIS on Fusetron Fuses.

Bussmann Mfg. Division, McGraw-Edison Co., St. Louis 7, Mo.

159

Play Safe! Install Fusetron dual-element fuses throughout entire Electrical System.

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS
McGRAW EDISON
BUSSMANN MFG. DIVISION · St. Louis 7, Mo.

For more facts circle 509 on Reply Card

MATERIALS-HANDLING NEWS

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

Many factors affect caster load capacities

Types of wheels, floor conditions, speed of travel must be considered in selecting casters. Bassick conservative load ratings protect users and are based on average operating conditions.

HARD VS. SOFT WHEELS

Soft rubber tread wheels protect floors but limit load capacity. Good rule of thumb is that soft tread wheels will carry half the load carried by a hard tread wheel of the same size. Where floor protection is desired, go to a larger size resilient tread wheel.

Your Distributor has New Products

These new or improved products developed by Bassick last year may aid materials-handling in your plant.

Light Duty Floating Hub caster shown above for loads from 50 to *150* lbs.

Rust-resistant Zinc plating on all Bassick formed steel truck casters . . . at no extra cost.

New improved "non-marking" composition Atlasite wheel almost as strong as steel, far kinder to floors.

Keeping you up to date on new product developments is one of many ways your local Bassick distributor can help you.

Semi-steel wheel where floor protection is unimportant
Improved Atlasite wheel won't mark floors, has high load capacity

Rough floors cut load ratings

Select a wheel large enough to ride over tracks, door sills, elevators, other obstructions. For rough floors or in areas where there are objects or debris on the floor, use a larger wheel with extra load capacity to secure proper ease of rolling and satisfactory performance. Two types of caster wheel are shown above.

Now it moves . . . Now it stands still

Sometimes it's convenient to move a machine to the job and then hold it steady in operation. R. R. Donnelly & Sons Company, a Chicago printer, solved the problem by putting this package-tieing machine on Bassick casters (for movement) equipped with combination wheel brakes and swivel locks (for standing still). Might be an idea here for you.

Speed and power affect carrying capacities

This heavy duty series "93" caster will support a static load of 80,000 lbs., but nothing like that load in action. Its rated carrying capacity, for normal slow movement of heavy equipment, is a conservative 10,000 lbs. or 15,000 lbs., for 8" and 10" sizes.

It is not designed to stand the strain of fast power pulled applications, however. These jobs, where speed may exceed 5 mph, normally call for a Trailer type of caster such as the Floating Hub swivel trailer caster rated at 500 to 1000 lbs. per caster.

p.1

THE BASSICK COMPANY
BRIDGEPORT 5, CONN.
IN CANADA: BELLEVILLE, ONT.

Symbol of SW Excellence
Bassick
A DIVISION OF
STEWART-WARNER CORPORATION

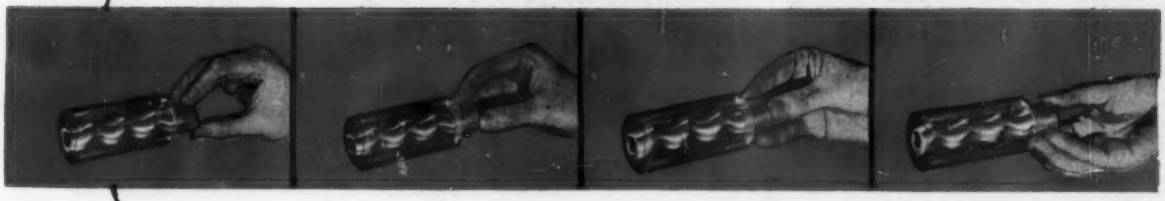
For more facts circle 510 on Reply Card

from abrasive slurries to delicate foods . . .

MOYNO® PUMPS

CUT HANDLING COSTS

The Moyno "progressing cavity" pumping principle has enabled thousands of plants to pipe difficult materials that were transported by hand and other expensive means. Moyno is the only pump that can handle many abrasives, pastes, slurries, chemicals, foods, suspended solids, etc. without foaming, aerating, crushing or excessive pump wear.



As shown above, Moyno Pumps have a screw-like rotor that revolves in a double threaded stator creating progressing cavities which smoothly move material through the pump. They will pump anything that will move through a pipe . . . even plaster and non-pourable pastes!

Moyno Pumps are available in capacities up to 500 gpm and pressures up to 1000 psi.

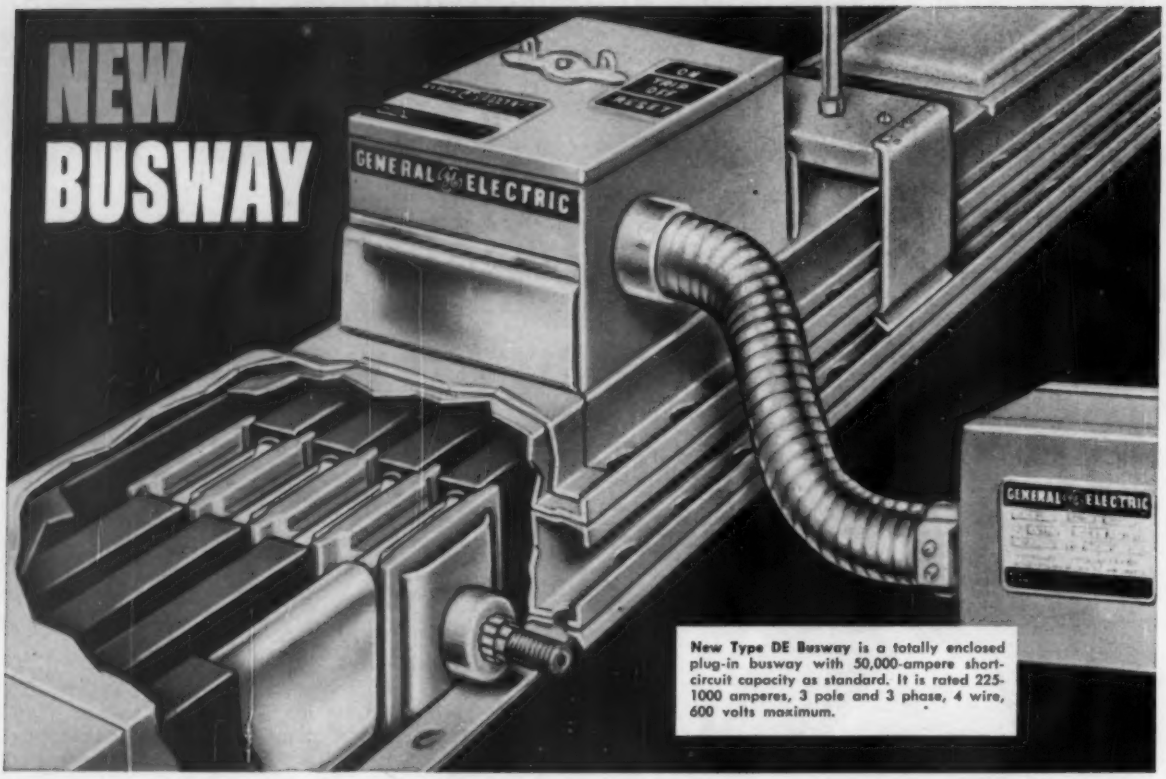
Examine your processing methods. No doubt there are several places where Moyno Pumps can drastically cut costs. Ask us, we'll give you a frank answer. Send us an outline of your problem today! Write for Bulletin 30-PE

ROBBINS & MYERS, INC.

SPRINGFIELD, OHIO — BRANTFORD, ONTARIO

For more facts circle 511 on Reply Card

New idea offers more for the money . . .



New Type DE Busway is a totally enclosed plug-in busway with 50,000-ampere short-circuit capacity as standard. It is rated 225-1000 amperes, 3 pole and 3 phase, 4 wire, 600 volts maximum.

Ampere for ampere, the smallest, lightest, most efficient and rugged ever designed

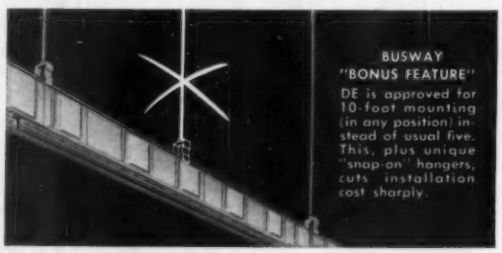
With Type DE busway you get the very best for less. Although its cost, considering material alone, is slightly higher than conventional plug-in busway, DE will generally take one-third less time to install, bringing an overall first-cost saving of approximately 10%.

At the same time, DE busway will offer benefits no other system can provide, such as:

- **New Margins of Safety.** Butyl insulation is extruded over the full length of each bus bar, virtually eliminating traveling arcs and making each plug opening essentially "dead front."
- **Greater Flexibility.** A telescoping length eliminates need for exacting layouts. This, plus the feature that allows individual sections to be removed without disturbing adjacent sections, saves time, trouble and expense in new installations, system adjustments or change-overs.
- **Greater Efficiency.** DE offers lowest voltage drop available for plug-in busway of comparable rating. Requires virtually no maintenance. Unique one-bolt electrical joint maintains contact between adjacent silver-plated aluminum bus bars with a ton of force, minimizing resistance and adding to efficient operation.

In short, Type DE busway incorporates *all* 22 of the features engineers, contractors and users say are important in busway design.

See your G-E sales representative or distributor for full details. Ask for a copy of Bulletin GEA-6173. Or write to **General Electric Company, Distribution Assemblies Dept., Plainville, Conn.**

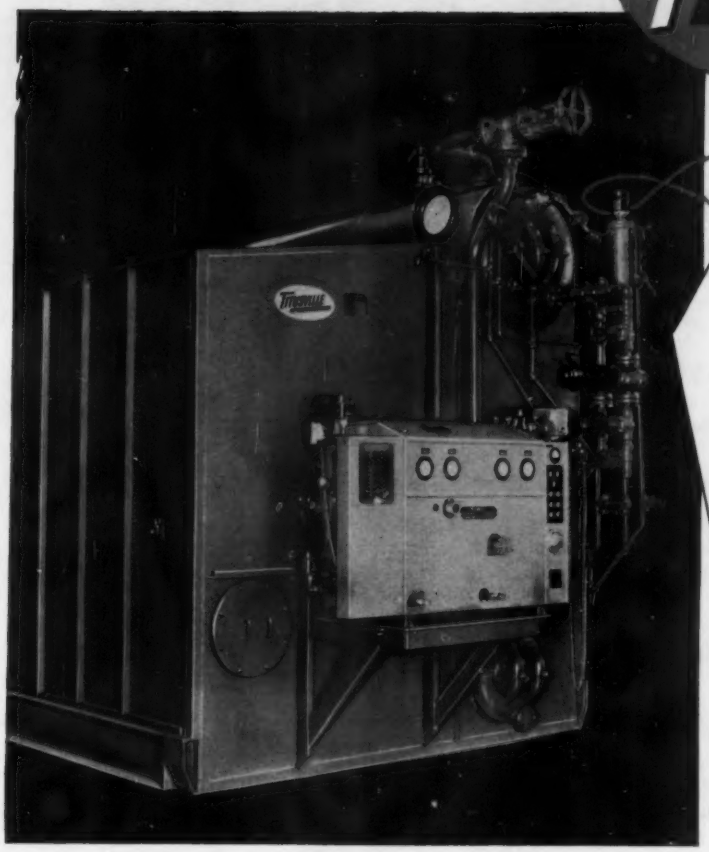

BUSWAY
"BONUS FEATURE"
DE is approved for 10-foot mounting (in any position) instead of usual five. This, plus unique "snap-on" hangers, cuts installation cost sharply.

GENERAL ELECTRIC

For more facts circle 512 on Reply Card

quality-built by TITUSVILLE

BOILERS SINCE 1860



PACKAGED FOR YOUR BOILER ROOM

the Titusville type WTP *packaged steam generator*

Complete Details in Bulletin No. B-3255

—Write for your free copy!

A completely factory-assembled, fully-equipped steam generator, the popular Titusville Type WTP is easily transported by rail or truck—ready for operation as soon as connected to fuel, steam and utility services. Compact in size, of TITUSVILLE quality in every detail, this advanced unit is supplied in capacities from 10,000 to 60,000 lbs of steam per hour. *Let us quote on your needs.*

THE TITUSVILLE IRON WORKS CO.

A Division of

Struthers Wells

TITUSVILLE, PENNSYLVANIA

Manufacturers of A Complete Line of Boilers for Every Heating and Power Requirement

Plants at Titusville, Pa. and Warren, Pa.

Offices in Principal Cities

BOILER DIVISION

BOILERS for Power and Heat . . . High and Low Pressure . . . Water Tube . . . Fire Tube . . . Package Units

PROCESSING EQUIPMENT DIVISION

Crystallizers . . . Direct Fired Heaters . . . Evaporators . . . Heat Exchangers . . . Mixing and Blending Units . . . Quick Opening Doors . . . Special Carbon and Alloy Processing Vessels . . . Synthesis Converters

FORGE DIVISION

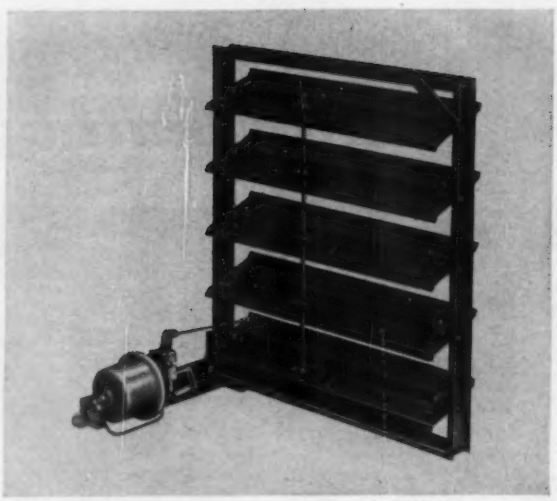
Crankshafts . . . Pressure Vessels . . . Hydraulic Cylinders . . . Shafting . . . Straightening and Back-up Rolls

For more facts circle 513 on Reply Card

HONEYWELL DAMPERS—SHUTTERS

...built to your specifications for accurate, dependable air flow control

Get the *exact* shutter, damper or louver you need from Honeywell. Specify any style or type, any blade materials and setting, any edging materials, any operator-mounting arrangement. Louver, round or right angle mixing types available for pneumatic, electric or manual operation. Whatever your needs, you're assured smooth, uniform performance when you specify custom-made Honeywell shutters for dependable air flow control.



...AND SHUTTER OPERATORS

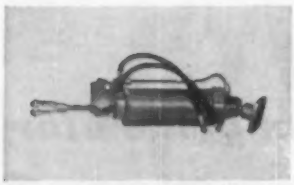
...ruggedly built for precise positioning—electric or pneumatic

There's an electric or pneumatic motor for every shutter application in the all-inclusive Honeywell line. Two or more motors can be operated in sequence or in unison. Motors can operate two or more shutter sections, provided the combined shutter load doesn't exceed motor capacity. Available for two-position or proportioning control.

Call your nearby Honeywell field engineer for a discussion of your needs. He's as near as your phone. MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

PNEUMATIC MOTORS

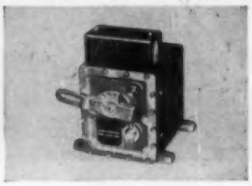
Grad-U-Motor shutter motor. Three sizes, for operating up to 48 sq. ft. of shutter area.



Heavy-duty, piston type ***Grad-U-Motor.*** For operating up to 96 sq. ft. of shutter area.

Air-O-Motor diaphragm motor. Three sizes, for operating up to 310 sq. ft. of shutter area.

ELECTRIC MOTORS



Modutrol motor operates up to 70 sq. ft. of shutter area.

Actionator operates up to 100 sq. ft. of shutter area.

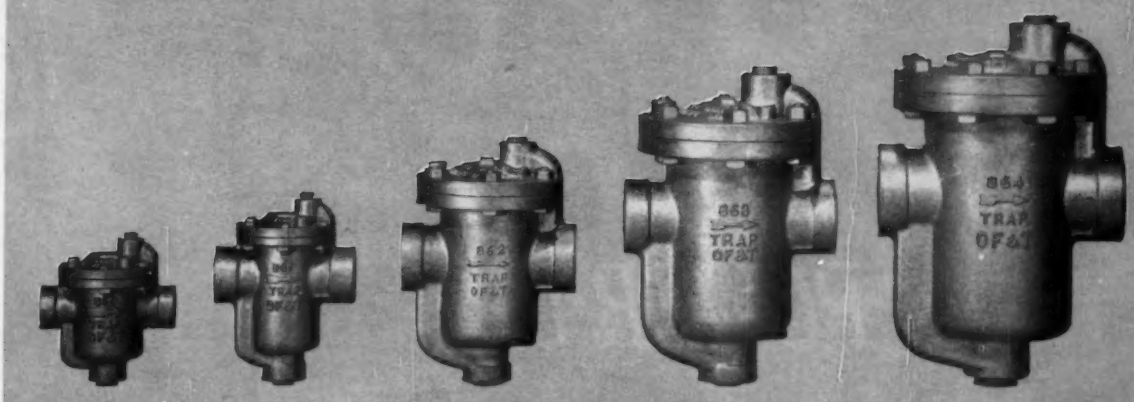
Series 831E Industrial Motor operates up to 370 sq. ft. of shutter area.

Honeywell

First in Control

ANNOUNCING a Complete New Line . . .

ARMSTRONG Open Float and Thermostatic Steam Traps



Designed and Made by Armstrong Especially for Low Pressure Heating Service

■ Armstrong Open Float and Thermostatic Traps are the result of the demand by user-owners and contractors for an effective, trouble-free steam trap for heating service.

How They Work

When the steam is first turned on, Armstrong O.F.&T. traps quickly vent the air that has accumulated in the heating units. After start-up, the traps will vent air and CO_2 gas at steam temperature to prevent corrosion of unit heater tubes and other types of finned radiation. Condensate is removed as fast as it accumulates without loss of steam.

Advantages of Armstrong O. F. & T. Traps

The design and construction of Armstrong Open Float and Thermostatic Steam Traps provides outstanding benefits to both the owner and the installing contractor:

LOW COST is made possible by simple, compact design and large volume production.

EASY INSTALLATION. Pipe connections are horizontal and opposite. Traps are supported by the connecting pipes.

INTERNAL CHECK VALVES of 18-8 stainless steel can be furnished with the traps to save cost of installing external check valves.

YEARS OF SERVICE LIFE . . . Working parts are all stainless steel, highly resistant to both corrosion and wear.

MINIMUM MAINTENANCE . . . comes not only from the use of stainless steel parts, but also because the trap is self-scrubbing. Ordinary sediment and sludge are washed right through with the condensate.

Further Information Available

If a trap with these features is of interest to you, get in touch with your nearby Armstrong Representative. Ask him for Bulletin 775 which gives price, dimension and capacity data, or use the coupon below.

ARMSTRONG MACHINE WORKS
9121 Maple Street • Three Rivers, Michigan

FREE BULLETIN
No. 775 gives detailed information on Armstrong O.F.&T. traps.

ARMSTRONG MACHINE WORKS
9121 Maple Street, Three Rivers, Michigan
Please send a copy of Bulletin No. 775.
Name_____
Company_____
Street Address_____
City_____ Zone____ State_____

For more facts circle 515 on Reply Card

POWER-UP!

calls for modern maintenance

SHOP REPAIR...

EFFICIENT—Modern repair craftsmanship plus modern facilities produce long-lasting electrical repairs to efficiently and economically cut your maintenance costs.

RENEWAL PARTS...

ECONOMICAL—You are assured modern materials properly engineered to fit your application.

FIELD SERVICE...

GUARANTEED—All modernized and rebuilt electrical equipment carries the same guarantee as new equipment. Fast service from a nation-wide network of plants provides prompt delivery. J-95200

YOU CAN BE SURE...IF IT'S Westinghouse

For more facts circle 516 on Reply Card

BULLETINS just released and of immediate plant interest

On pages 177-178 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

MATERIALS HANDLING

101 Overhead Handling—Twelve-pp Booklet 2008-N on overhead materials handling equipment contains detailed studies of track design, peening and stresses. Also covered are various types of carriers, cranes, tractors, track switches, buckets, grabs and electrification. Photos illustrate a variety of installations. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

102 Oscillating Conveyors—Book 2744, 24 pp, is devoted to company's Flexmount, Coilmount and Torqmount conveyors. These oscillating conveyors cover a material capacity range from 25 to 350 tons per hour. Product information provided includes trough widths, depths, section lengths, accessories and selection and application data. Also included is discussion of oscillation as a preferred method of conveying hard-to-handle materials. Link-Belt Co.

103 For Materials Handling—Featured in Data Sheet 50 is a line of platform trucks, trailers, carts, skids, wheels and barrel trucks. Also included is detailed data on features, design specifications, sizes, capacities, plus information on engineered materials handling systems. S I Handling Systems, Inc.

104 Walkie-Type Truck—Operational features that make the "Transporter" walkie-type truck suited for work in congested areas and for short hauls or intermittent operations are illustrated in this 16-pp bulletin. Lists facts to consider in analyzing truck requirements and illustrates typical applications. Specifications included. Automatic Transportation Co.

105 On Sling Chains—Twenty-pp Bulletin A is a revised catalog on McK-Alloy sling chains and attachments and provides comprehensive specifications on products in sizes from ¼- through 2-in diam. Covers standard single, double, triple and quadruple branch slings, as well as adjustable, basket and endless slings, other types. Also illustrates master rings, pear-shaped and oblong links and features the new Coupl-Loy connecting link for field assembly. A section is devoted to use, care, safety and inspection of sling chains. The McKay Co.

106 Roller, Wheel Conveyors—Eight-pp Bulletin MHC 58 describes flip-out roller and wheel conveyors designed for easy replacement by means of a spring section attached to the shaft. General information and selection data are included. Conveyor Systems, Inc.

107 Industrial Casters—Described in this bulletin is a line of truck casters for a variety of industrial applications. Illustrations and detailed specifications. Faultless Caster Corp.

108 Caster, Wheel Manual—Featured in 192-pp Manual 65 is comprehensive information on company's complete line of casters, wheels, glides, desk shoes and accessories. Profusely illustrated with photos and dimensional drawings and diagrams of the various types of casters and wheels for a variety of applications, the manual contains tabulated engineering and price data. Darnell Corp.

109 Salt Cake Handling—Problems involved in handling of salt cake are treated in 8-pp Fact File ER-26-1. Methods employed by typical users are discussed. Tables, schematic and dimensional drawings and photo detail characteristics and capabilities of different systems in use. Fuller Co.

110 For Remote Handling—New devices for remotely handling radioactive, toxic or highly flammable materials are described in this 20-pp booklet. Features the Mechanical Arm which provides the sensitive touch required in handling light, delicate instruments, as well as the strength and agility required to lift and position loads of several tons. Mechanical Div., General Mills, Inc.

111 Parts Feeders—This 16-pp catalog presents vibratory parts feeders for automatic, oriented, rate-controlled feeding of small, hard-to-handle parts. Provides data and specifications for five standard model bowl-type feeders, two "fluid-power" models and five transfer-and-storage units for inter-process parts handling. Gives details on parts feeder components available for "do-it-yourself" systems. Syntron Co.

PUMPS, PUMPING

112 Centrifugal Pumps—Eight-pp Bulletin 720.4 describes single-stage, side suction centrifugal pumps with open impeller for a variety of industrial uses. Specifications, sectional view, dimensional chart, materials of construction and parts interchangeability charts, and performance curves included. Goulds Pumps, Inc.

113 Double Suction Pumps—Six-pp Bulletin 251 features company's Type DMB and DB ball bearing, horizontal split case, double suction centrifugal pumps for general water service. Includes detailed specifications, sectional view, selection table, dimensions. Warren Pumps, Inc.

114 Motor-Pump Units—Twenty-sizes of Motorpumps with off-the-shelf availability are featured in 8-pp Form 70022. They come in sizes of ⅓ through 25 hp, for heads to 190 ft, capacities to 775 gpm. Bulletin contains drawings pinpointing features of the units' impellers, seals, casings and motors. Selection charts, friction tables and a typical work sheet included. Ingersoll-Rand Co.

115 Fluid Power Equipment—Bulletin 10051-G, 12 pp, includes specifications, illustrations and descriptive matter on company's fluid power equipment. Covers variable delivery one- and two-way pumps; constant delivery duplex and automatic feed pumps; constant displacement, variable displacement, reversible motors; variable speed transmissions; standard and heavy-duty cylinders; presets, amplifiers, panels and servo valves for electrohydraulic systems, and accessories. The Oilgear Co.

ELECTRICAL

117 Breaker Selection Guide—Compact, pocket-size Bulletin 5004-1A presents construction and performance features, ratings and details on molded-case circuit breakers with ratings of 10 through 800 amp, and on enclosures for these breakers with NEMA 1 through 12 classifications. A master selection chart groups breakers by types and current ratings and lists under each the voltage and interrupting ratings for a-c and d-c units, descriptions of overcurrent devices and accessories and modifications. I-T-E Circuit Breaker Co.

118 Reduced Voltage Starters—Design features of automatic reduced voltage starters are described in 12-pp Bulletin 14B8192. Includes motor control for centrifugal compressors, pumps, large conveyors, large fans, etc. Lits advantages of autotransformer, closed transition connection, primary resistor and reactor, part winding and star-delta starters. Covers theory and operation of low voltage starters. Also gives starting characteristic calculations, horsepower ratings. Allis-Chalmers Mfg. Co.

119 Metal-Clad Switchgear—Bulletin 2804-1A, 24 pp, describes 4160-v metal-clad switchgear, covering indoor and standard and walk-in outdoor type equipment with ratings through 3000 amp continuous current and 350-mva interrupting capacities. Bulletin is illustrated with photos, sketches, diagrams and drawings and includes charts and tables. Construction and performance features, ratings and dimensions are furnished. Panel layouts and dimensions for standardized units provided. I-T-E Circuit Breaker Co.

120 Foot Switch—This data sheet describes a heavy duty foot switch for machine tools, presses, motors, featuring a high electrical rating, cast iron enclosure, protective toe guard. Photos, dimensional drawing, characteristics, and electrical ratings included. Micro Switch, Div. Minneapolis-Honeywell Regulator Co.

BULLETINS

(Begins on page 21)

121 Limit Switches — Sixteen-pp Catalog 84 gives details of three types of heavy duty limit switches for industrial uses: plug-in 200LS series, featuring quick replaceability; compact LS series; and rugged ML switches in regular or explosion-proof types. Catalog lists switches with a variety of contact arrangements for d-c or a-c applications. Several actuator designs in each type shown. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

122 Precision Switches—Catalog 101d, 24 pp, covers the representative line of company's snap-action and mercury switches. Includes data on high-temperature, maintained-contact, explosion-proof, high capacity, proximity, oil-tight, environment-free and multicircuit types. Photos, dimensions, electrical ratings, characteristics and application information. Micro Switch, Div. Minneapolis-Honeywell Regulator Co.

123 Rectifier Transformers—Bulletin GEA-6845, 6 pp, provides information on the construction features and function of mercury arc rectifier transformers used in electrochemical, transportation and industrial applications. It includes photos, circuit diagrams, rating tables and a listing of standard features and accessories. General Electric Co.

124 Rectifier Equipments—Bulletin GEA-6849, 12 pp, describes the features and characteristics of self-contained, metal-enclosed power rectifier unit substations for industrial, transportation and electrochemical applications. Includes description of substation components, photos, line drawings, comparative power cost curves, a guide illustration for estimating savings in d-c power conversion costs, and a list of publications on components. General Electric Co.

125 Tong Test Ammeter—This 8-pp bulletin illustrates eight types of instruments and gives detailed information on the selection, ordering and use of Tong Test ammeters for measuring both a-c and d-c. Includes typical scale ranges, selection data. Columbia Electric Mfg. Co.

126 Crane Electrification—Booklet 2 describes wall-mounted, aluminum mill-type, inverted-Y electrification for traveling cranes in steel mills, ore bridges and other moving equipment requiring heavy amperage. Features are shown, advantages cited. The Cleveland Crane & Engineering Co.

127 For Special Protection—Sealed safety switches, sealed safety receptacles, feed-in- plugs, vented clock, pilot lights, Switch Unilets, grounding Unilets, current taps and other equipment designed to protect against fire and explosion hazards in hospitals are described in this 12-pp bulletin. Illustrations and dimensional data given. Appleton Electric Co.

128 For Hazardous Locations—Six-pp Bulletin 2710 describes design and construction principles involved in manufacturing condulet electrical equipment for hazardous locations. Also emphasized is variety of explosion-proof equipment in everything from lighting to motor controls. Crouse-Hinds Co.

LIGHTING

129 Fluorescent Lamps—Featured in this illustrated bulletin are fluorescent lamps with a series of grooves along the side, designed to greatly out-produce the light output of high-output fluorescents. Advantages of the Power-Groove are detailed and application possibilities pictured and described. A footcandle table is included. General Electric Co.

130 Lighting Equipment—These notebook-bound catalog sheets feature illustrations and descriptions of company's lighting fixtures and accessories, including photometric and dimensional data. Catalog is divided into sections covering indirect lighting silvered bowl, large area silvered bowl, accent and down lighting silvered bowl, and fluorescent lighting. Silvray Lighting, Inc.

131 Vaportight Fixture—Twenty-pp Bulletin 5-A covers a line of convertible, vaportight lighting fixtures designed especially for use with heavy-wall, rigid conduit in areas where vapor and heavy-air create lighting problems. Complete description and dimensional data are included, as well as cutaway views of construction. Appleton Electric Co.

HEATING, VENTILATING AND AIR CONDITIONING

132 Heating, Ventilating Units—Twenty-pp Bulletin 910 describes Herman Nelson heating and ventilating units, in 12 sizes, capacities from 600 to 73,000 cfm. Gives information on coil selection for both steam and hot water. Capacity tables, air resistance charts and rpm and hp tables are provided. A section is devoted to dimensions and standard arrangements. Generously illustrated bulletin describes components and accessories of the line, including Roll-O-Vent filter. American Air Filter Co., Inc.

133 Electric Strip Heater—Bulletin F-1615 illustrates and describes electric strip heaters. Includes examples of applications of both straight and curved elements to a wide range of equipment sizes and shapes. Also contains a chart of sizes, wattages, sheaths and special features. Edwin L. Wiegand Co.

134 Radiant Heaters—Bulletin F-1613, on electric radiant comfort heaters, covers both a new ceiling type and an angular-mounted model. Illustrates typical "spot-heating" as well as large area heating problems solved with these heaters. Also describes controls by which individual heater radiation may be regulated to requirements. A selection guide is included. Edwin L. Wiegand Co.

135 Air Diffusers—Bulletin 30F presents information on company's air diffusers, high velocity valve attenuators, and air recovery equipment. Units are described and illustrated. Connor Engineering Corp.

136 Blower Units—This 16-pp bulletin covers an expanded line of medium pressure air conditioning units in sizes from 500 to 50,460 cfm, in vertical or horizontal models. Construction features and accessories are illustrated, and physical dimension charts included. M. Blazer & Son.

137 Blowers at Work—How units of company's California series of rotary positive pressure blowers and gas pumps are used to solve several air and gas handling problems is told in 8-pp Bulletin S-59G. Illustrated with photos and dimensioned drawing, bulletin shows a variety of applications. Also includes discussion of basic blower, its operation, construction, types of drive etc. A chart outlines performance examples of 20 blowers and pumps. Sutorbilt Corp.

138 Multizone Units—Catalog 1635-B describes blowers for multizone central air conditioning systems. Comprehensive performance and application data are given, including construction details, dimensions and typical specifications. Sturtevant Div., Westinghouse Electric Corp.

139 Room Conditioners—Twelve-pp Bulletin 9327 outlines features of individual room design air conditioners, and describes various enclosures. Cooling ratings are listed, as well as heating capacities, water pressure drop and one-row steam coil heating capacity. A series of installation-type drawings provide dimensional data, and line drawings illustrate arrrangements. Specifications given. American Blower Div., American-Standard.

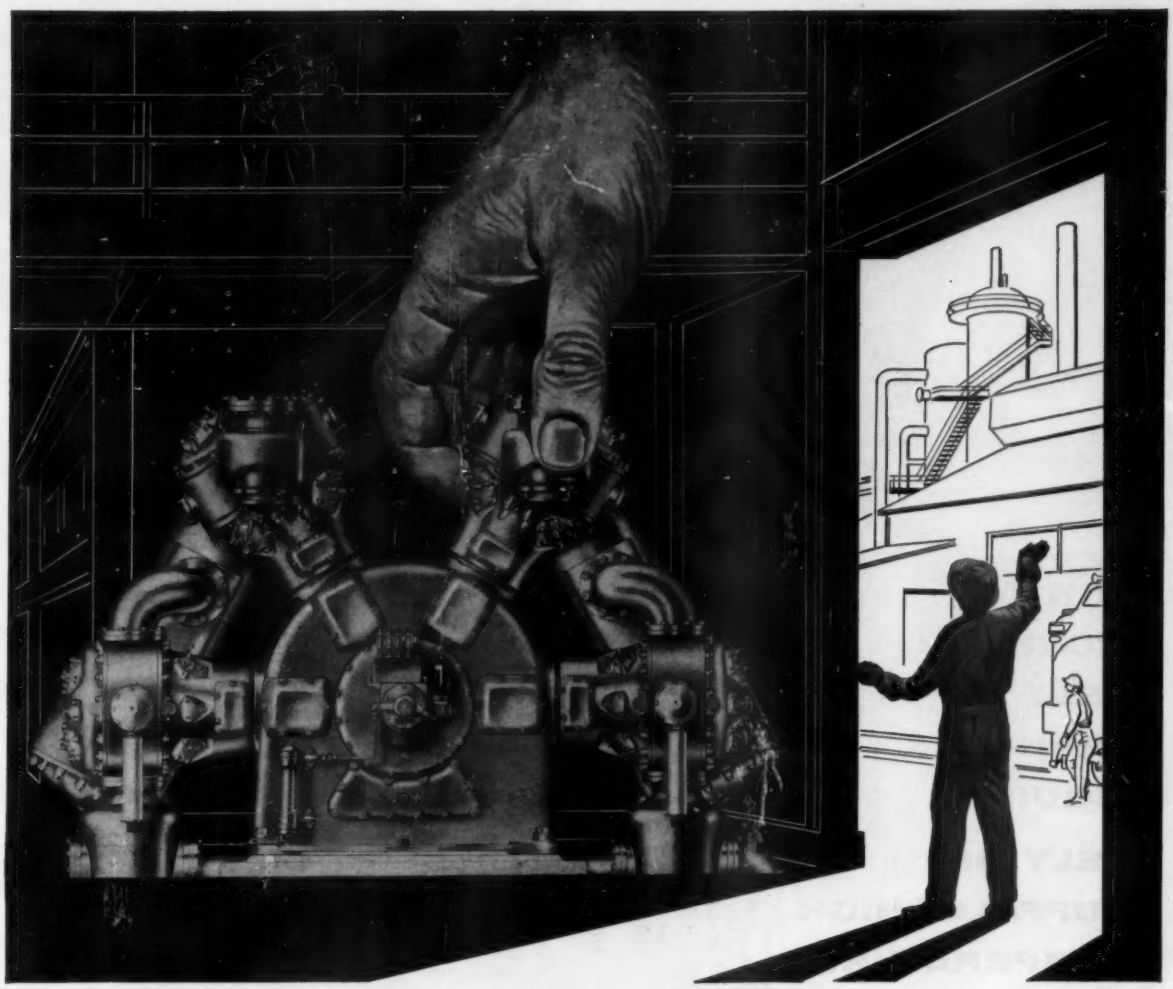
MECHANICAL POWER TRANSMISSION

141 Motorized Gear Drive—Bulletin 2350 describes Line-A-Spede motorized gear drives which are gear reducers powered by standard NEMA frame motors mounted on a shelf attached to the reducer. Illustrates construction features through cutaway view, and includes engineering specifications. The Louis Allis Co.

142 For Power Transmission—Bulletin 3101, 8 pp, describes sheaves, variable-pitch cheaves, V-belts, flat-belt pulleys, pillow blocks, flange units, take-up bearings, couplings and timing-belt drives. Photos and dimensional diagrams are included. T. B. Wood's Sons Co.

143 Variable Speed Drive—Eight-pp Bulletin M-588 explains how design features of company's sanitary type variable speed drive fulfill the requirements of food and allied industries. Also includes condensed drive specifications, assemblies and dimensions. Reeves Pulley Co., Div. Reliance Electric and Engineering Co.

(More Bulletins on page 179)



SET A 500 TO 1000 HP AIR COMPRESSOR IN THE CORNER OF YOUR PLANT . . . *almost as easy as this*

IF YOUR EXPANDING PLANT FACILITIES are requiring more compressed air . . . *and* putting a squeeze on plant space, here's the answer . . . the *new* Joy WN-224 compressor. Because of its compact semi-radial design, the WN-224 is delivered as a package—completely assembled—ready to go. Just bolt it down, connect power, water, and air lines . . . and you're ready for long, continuous service. This is the only true "package" compressor available in these capacities . . . 2418 to 6048 cfm . . . horsepower ratings from 350 to 1000.

AND THE WN-224 SOLVES YOUR SPACE PROBLEMS . . . it can be installed where no other compressor of equal capacity will fit. Instead of long, horizontal units on massive foundations, the Joy WN-224 has four cylinders arranged semi-radially around the frame. This compact, balanced arrangement assures smoother running, gives longer service with far less maintenance. Get the whole story on the WN-224 from ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

WBW I 6666-179

Write for FREE Bulletin 179-15

JOY . . . EQUIPMENT FOR INDUSTRIAL PLANTS . . . FOR ALL INDUSTRY

Industrial Compressors

Conveyors

Electrical Connectors

Fans and Blowers

For more facts circle 517 on Reply Card

FOR MOVING HEAT TRANSFER LIQUIDS...

RELY ON "BUFFALO" HIGH TEMPERATURE PUMPS

These pumps are designed especially for handling high temperature liquids. The following description will help you evaluate the suitability of these pumps for this specialized service.

In addition to these special features, "Buffalo" High Temperature Pumps bring you the famous "Buffalo" hydraulically efficient impeller and casing design. Accessibility, dependability and long, maintenance-free life are important *extra* values in every "Buffalo" Pump.

Whatever your heat transfer problem — including vapor phase — phone your "Buffalo" engineering representative for full information.

Only "Buffalo" Pumps bring you the famous "Q" Factor — the built-in QUALITY that provides trouble-free satisfaction and long life.

BUFFALO PUMPS

Division of Buffalo Forge Co.

165 Mortimer St., Buffalo, N. Y.

Canada Pumps, Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

"Buffalo" PUMPS

Water Cooled Bearings and Stuffing Boxes

Special Packing Mechanical Seals are Available

Smothering Gland

Flexible All-Steel Coupling

Colmonoy-Coated Shaft Sleeve Thru Stuffing Box

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

For more facts circle 518 on Reply Card

LOOK *at the hazards in floor maintenance*

SLIPPERINESS

Taking slipperiness out of your floors is worthwhile insurance against slips and falls.

It's easily done with a specially blended West resin emulsion. This safe, high-traction finish contains no wax — yet produces a glossy, hard, durable film on all types of floors.

Slipperiness is only one of many floor problems. Others are just as common. Staining. Dirt retention. Excessive dust. High labor costs. To name a few. All can be prevented — often at reduced cost — with a complete WEST FLOOR CARE PROGRAM.

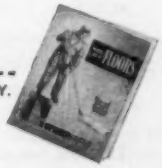
The WEST FLOOR CARE PROGRAM consists of three basic steps. Cleaning. Sealing. Maintaining. Each adapted to the individual needs of floors by West Representatives who specialize in methods as well as materials.

We'd be glad to show you how a WEST FLOOR CARE PROGRAM protects floors, modernizes methods, eliminates hazards. Write, or telephone your local West office.

Programs and Specialties for
Protective Sanitation and Preventive Maintenance

WEST CHEMICAL PRODUCTS INC.

WEST DISINFECTING DIVISION



WEST CHEMICAL PRODUCTS INC., 42-16 West Street, Long Island City 1, N. Y.
Branches in principal cities • In Canada: 5621-23 Casgrain Ave., Montreal

☐ Please send your 32-page booklet, "The Proper Care of Floors."

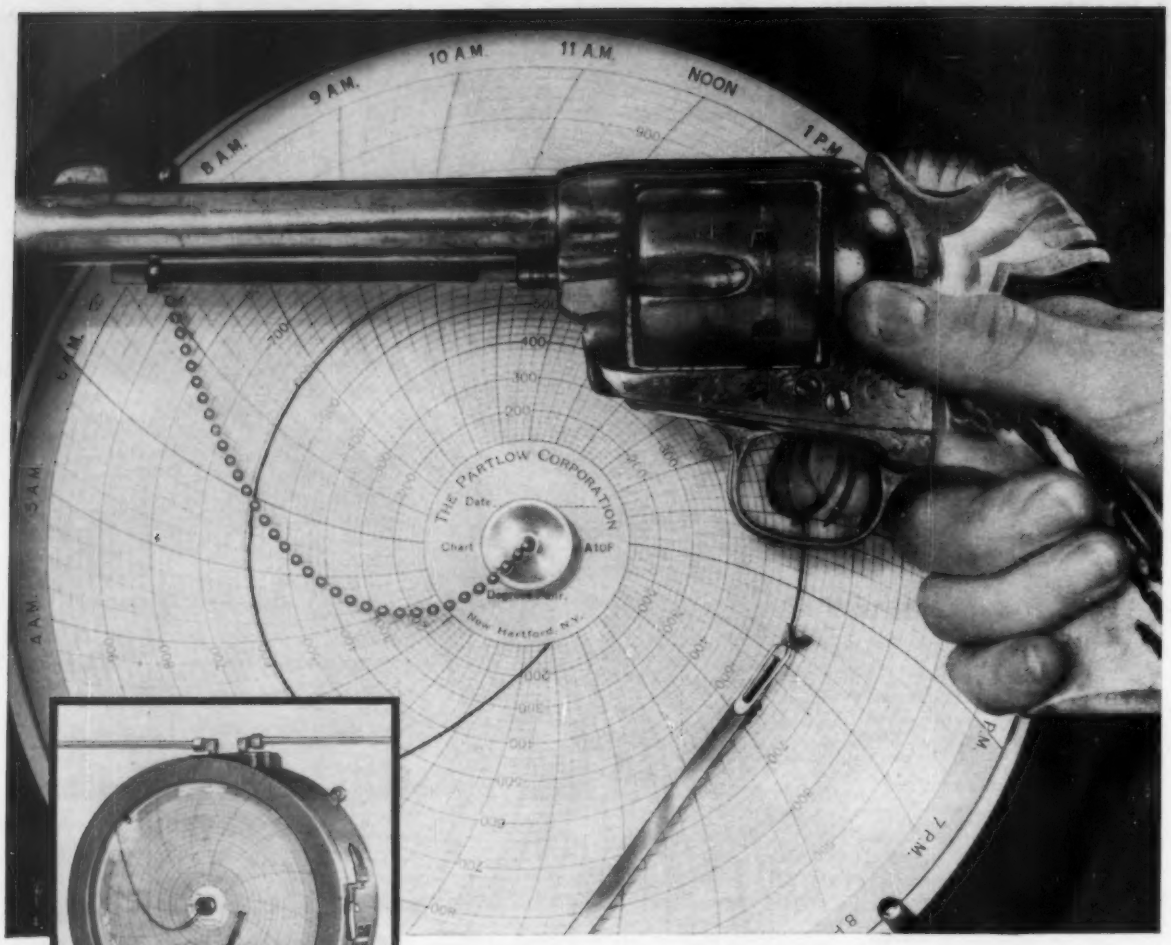
☐ Please have a West Representative telephone for an appointment.

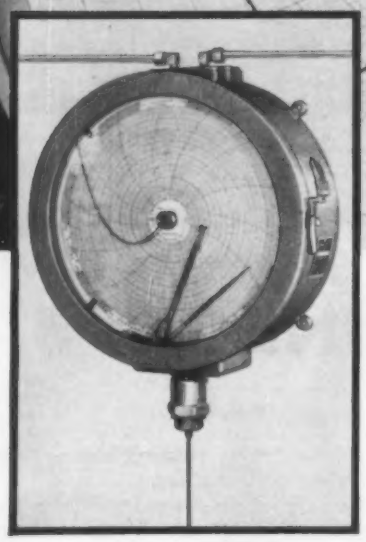
Name_____

Position_____

Mail this coupon with your letterhead to Dept. 13

For more facts circle 519 on Reply Card





The Control Geared for

HAIR TRIGGER RESPONSE

even to Fractional Changes in Temperature!

NEW *Recording Pneumatic Temperature Control, Model RVA, available in any of 10 ranges from -30° to 1100° F.*

Extreme sensitivity—reflected in lightning-fast reaction to temperature changes—is a characteristic of *all* Partlow controls. Partlow Recording controls, however, *prove it in writing* . . . You can see for yourself how exceptional bulb sensitivity, teamed with advanced mechanical design, provide a minimum of "saw-toothing" on start-up, and maintain a rigid line of control when temperature reaches a predetermined set point.

Instant response, of course, is just one of Partlow's many built-in advantages. Another is rugged *design simplicity* that does away with hair springs and delicate electronic gadgets . . . that requires no electronic amplification . . . that permits fast, "screwdriver" replacement of the thermal element *right out in the field.*

If you use or manufacture process equipment within the -30° to 1100° F. range, there's a Partlow Pneumatic, electric or self contained gas control to fit your application *precisely*. Recording, indicating and non-indicating models available. For full details write The Partlow Corp., New Hartford, New York, Dept. PE-159.

You can pay more but you can't buy better than

PARTLOW

TEMPERATURE CONTROLS

For more facts circle 520 on Reply Card

Hall Industrial Water Report

VOLUME 7 JANUARY 1959 NUMBER 1

Let's Get This Clear

Day after day new products are being developed to improve the clarification of water. The standard coagulants, aluminum and iron sulfates, have long been supplemented with aids like clay and magnesium oxide. Some 20 years ago Baylis developed activated silica. But today new materials to assist clarification with the standard coagulants are coming along faster and faster. They are designed to improve removal of color, bacteria and suspended material from potable and industrial water, to cut costs by reducing coagulant consumption, to assist in removal of deleterious materials from waste water and to assure optimum operation of clarifiers and filters.

Hall Laboratories research and development continually provides improved coagulant aids, field tested for performance. Furthermore, Hall engineers know clarification equipment and processes. They are ready to help you improve clarification or reduce water treatment cost.

Feeding Ferric Sulfate

Ferric sulfate is a commonly used coagulant. When fed with a solution feeder, care must be taken to get the chemical completely into solution. Otherwise, undissolved material will cause trouble in the feeding equipment and effectiveness will be lost.

Each pound of ferric sulfate liberates about 260 BTU when it goes into solution. The resulting solution temperature increase has an important effect on rate of solution. If tap water temperature is too low, or if the ratio of water to ferric sulfate is too high, there will be troublesome undissolved material. Furthermore, final solution temperature should be 90°–100° F.

The practical trick for easy handling is careful adjustment of the water-to-chemical ratio. If water temperature is 68° F., dissolution of ferric sulfate will be complete in 18 minutes and final solution temperature will be about 98° F., if the ratio of water to solid ferric sulfate by weight is five. If water temperature is only 47° F., the solution rate and final temperature will remain the same, provided the ratio of water to chemical is cut to three. These examples may be used as a guide; obtain complete dissolving information from the manufacturer of the material used.

Water Color Problem

An Eastern woolen mill is located downstream from other woolen mills, a steel mill and a sewage plant. Needless to say, the river water is badly contaminated with organic coloring matter, suspended matter and detergents during summer droughts and extremely cold weather. Clarification has been difficult. Even with heavily increased alum dosages color removal was poor. This was a costly situation because it frequently necessitated reprocessing of the delicate pastel shades which are a specialty of this mill.

More than two years ago Hall Laboratories introduced the plant to coagulant aids. After laboratory jar tests were carried out to determine the type of aid best suited to this particular case, the plant adopted the use of a Hagan aid during periods of high color. Not only have floc formation, sedimentation and color removal been greatly improved, but alum dosage has been reduced by 25%. The plant operators say they feel sure they would have had to suspend operations during the 1957 drought if they had not been using the Hagan coagulant aid.

No Clarifier Needed

A growing Southern textile plant was forced to curtail operations because water requirements exceeded the total capacity of the wells. Further expansion was anticipated. The additional water required would have to come from a surface supply.

Faced with the installation of expensive clarification equipment and costly chemical treatment to make the water suitable for process work, the plant called on Hall Laboratories to study the problem. Hall engineer R. E. Elliott carried out the survey and came up with a money-saving answer. He found that a lot of water could be saved by re-using cooling water from closed heat exchangers, by repairing overflow mechanisms and by using untreated surface water for non-critical operations. No treatment of surface water would be necessary and enough good quality well water would be saved to permit *doubling* current operations.

Potential Trouble

When Hall engineer Peter Benes began service work at a Southern chemical plant he found a clay-like deposit accumulating in the sodium cycle units of the split-stream softeners. Because of previous bad experiences with aluminum in boiler water, Benes became alarmed when analysis showed the deposit to contain considerable aluminum.

Further analytical work traced the aluminum to the clarified and filtered makeup water. Clarification was accomplished with aluminum sulfate; but operation and pH value were such that there should have been very little aluminum in the filtered water. Benes kept digging. He found that soda ash, used to adjust upward the pH of the clarified water, was being added ahead of the filters. This resulted in dissolution of some of the small amount of suspended aluminum hydroxide floc passing to the filters.

Immediate change was made to feed the soda ash after the filters. Aluminum concentration of the filtered water dropped from 0.15 ppm to 0.05 ppm and the problem was solved.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information on how the Hall System can help you solve your particular water problems, write, wire or call address below.

Water is your industry's most important raw material. Use it wisely.

HALL LABORATORIES
DIVISION OF HAGAN CHEMICALS & CONTROLS, INC.
HAGAN BUILDING, PITTSBURGH 30, PA.
In Canada: Hagan Corporation (Canada) Limited, Toronto

Hall Laboratories—Consultants on Procurement, Treatment, Use and Disposal of Industrial Water

For more facts circle 521 on Reply Card

Reduces Pipe Handling Time by 83%

Savings Pay for Tramrail System in One Year

▲ The Tramrail transfer crane travels in the middle bay and connects as desired with the spur tracks over the side bays, thus enables the hoist carrier reaching every part of the room. Incoming pipe is lifted from railroad cars with a Cleveland Tramrail hoist carrier operating on a track serving the floor above and lowered through the hatchway at one end of this warehouse.

◀ Outgoing pipe is brought directly from storage to trucks. The hoist and entire system is rated at one ton.

SEVERAL hundred tons of ⅛ to 16 inch diameter pipe are received at the Pipe Warehouse of Palmer Supply Co., Seattle, Washington, per month. To handle this by hand was such a loathsome chore that it was difficult to keep men at this work, and the labor turnover was large.

The installation of a Cleveland Tramrail track and transfer crane system took over the fatiguing job of lifting, as well as hauling, of the pipe into and out of the warehouse. It made possible the handling of large, heavy bundles per trip in less time than required for one or a very few pipes by manual handling. It thereby reduced the man-hours required for pipe handling to approximately one-sixth. Resulting dollar savings paid for the system in one year.

Cleveland Tramrail equipment offers you so much and pays off in so many ways for such a long time that we urge you to study its possibilities in your plant.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7507 East 290 Street, Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

For more facts circle 522 on Reply Card

How RYKON GREASE

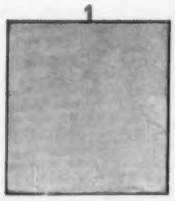
has performed in six tough applications

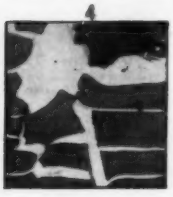
In just two years since introduction, RYKON Grease has stepped in to deliver lubrication in hundreds of applications where other greases have failed

The reason RYKON Grease can perform under conditions that cause other greases to fail is this: RYKON Grease has a unique non-soap, organic thickener. This thickener holds the oil between its fibers better than any other gelling agent. The thickener is able to withstand extremely high as well as low temperatures. It resists chemical action and remains stable under conditions of severe working and water washing. RYKON Grease has exceptional anti-rust properties.

RYKON Grease's unique properties make it truly multi-purpose. This leads to many worthwhile economies. With one grease to do possibly every grease lubrication job in a plant, there's no chance for application mistakes. Inventory and handling of many single-purpose greases is reduced or eliminated. Maintenance training and supervisory follow-up is greatly reduced.

More facts about RYKON Grease are yours for the asking. Call the lubrication specialist in your nearby Standard Oil office in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Illinois.**





In the metalworking industry, where higher speeds, loads, temperatures and pressures are being put on bearings as a means of increasing productivity of equipment, a new type of grease has been needed. RYKON is that grease. Here are just 6 examples of how RYKON Grease has performed in tough spots:

Industry	Equipment	Type of Bearings	Conditions	Remarks
Metalworking	bearings over molten pot	—	high temperature	Temperature reaches 500° F. at times. RYKON stays in longer.
Steel Mill	pit crane, floor crane, charging car	plain and anti-friction	high temperature	Lasts twice as long as some other greases used.
Metalworking	drill head multi-spindle	anti-friction	heavy load	Other greases failed. Running cool on RYKON. No leakage.
Auto Manufacturer	switches on machine tools	—	wet	Good water protection and dielectric strength at a lower cost than previously.
Die Caster	die cast machines	various	high temperature	Cut down wear considerably.
Bearing Manufacturer	high speed spindle bearings	anti-friction	high temperature, heavy load	Lasts twice as long as a high priced bearing grease. Does not darken or form varnish.

You expect more from STANDARD *and you get it!*

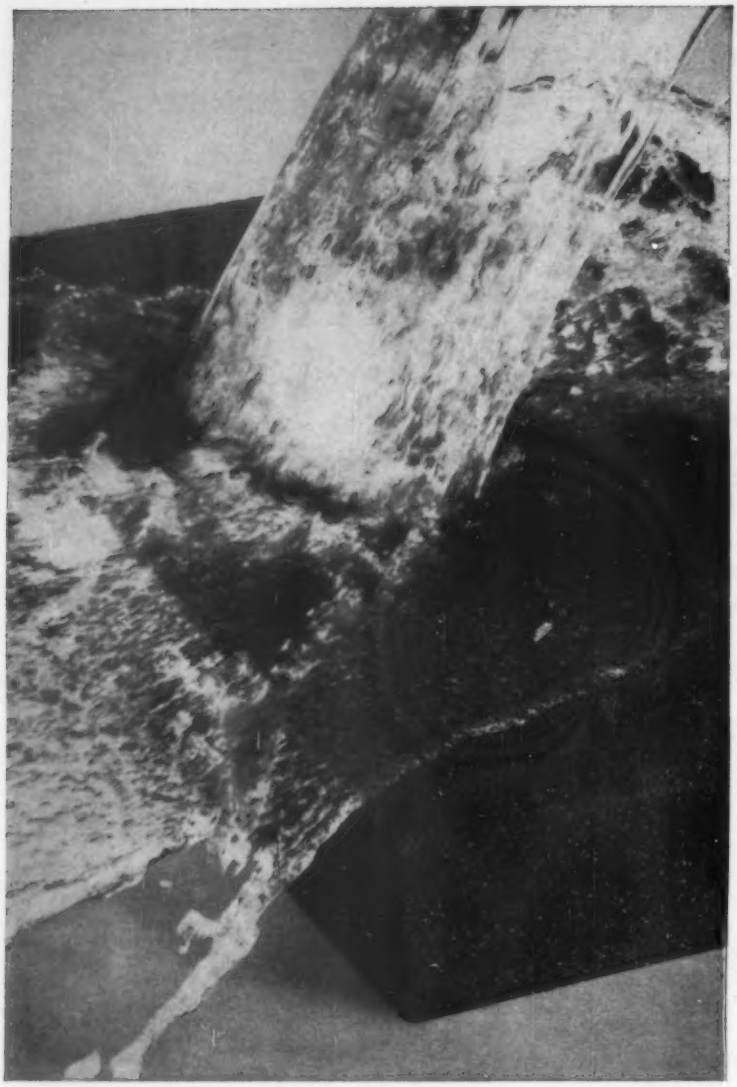
Oven test shows high temperature performance of RYKON Grease. 1. Metal panel coated with RYKON and placed in oven at 350° F. 2. Same panel after five days. RYKON is still soft and ready to lubricate. 3. Another high-melt grease ready for same test. 4. Same panel after oven test. Grease has failed completely.

For more facts circle 523 on Reply Card

3392

Only cellular glass insulation

FOAMGLAS® IS THE ONLY



Whether you insulate building roofs and walls, piping or equipment, you can seldom anticipate *all* of the conditions to which your insulation will be exposed after installation. Humidity conditions change. Temperature control needs vary. Even the original use for insulated space or equipment may alter. That's why the ideal thermal insulation must give you a *combination* of key benefits . . . in order to serve satisfactorily under all possible conditions.

Most important, the ideal insulation must be impervious to water vapor as well as liquids—in order to insure constant performance under all humidity exposures. It should be proof against acids and acid vapors. It should be incombustible . . . dimensionally stable . . . impervious to vermin . . . strong enough for a variety of structural uses. Just one insulation—cellular glass—meets all of these qualifications.

FOAMGLAS is the only cellular glass insulation.

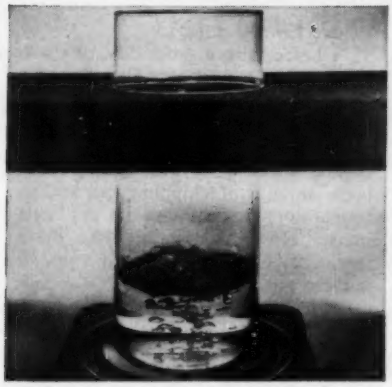
FOAMGLAS may well be the one satisfactory solution to all your insulating problems. For detailed literature, write—specifying your particular insulation requirements—to Pittsburgh Corning Corporation, Dept. PE-19, One Gateway Center, Pittsburgh 22, Pennsylvania.

PC Glass Blocks and FOAMSIL® are other outstanding products of Pittsburgh Corning.

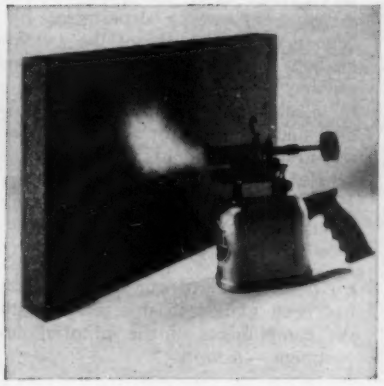
P I T T S B U R G H

gives you all these key benefits

CELLULAR GLASS INSULATION

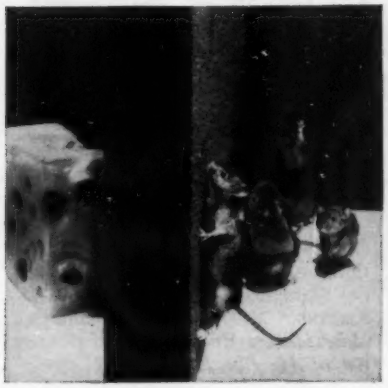


Moisture-proof! The minute liquid or vapor enters an insulation, it begins to lose its insulating value because moisture conducts heat. FOAMGLAS, a material composed entirely of sealed glass cells, is completely impervious to all moisture. Its K factor—measure of insulating performance—never varies.

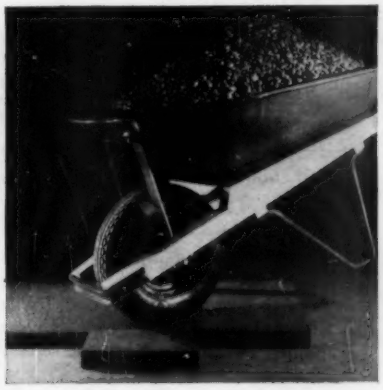


Can't Burn! Smoldering insulation in walls or roof of a building is a deadly fire hazard, hard to detect, difficult to control once detected. FOAMGLAS eliminates this hazard because it is the only insulation composed entirely of incombustible glass. This may even mean lower fire insurance rates in some cases.

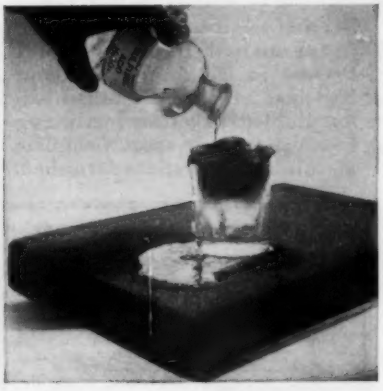
Dimensionally Stable! Most insulations tend to warp, swell, shrink or slump after they are installed. This causes open joints in the insulation . . . insulation voids that create a serious loss of efficiency. There is no such difficulty with FOAMGLAS. This all-glass insulation always maintains absolute dimensional stability.



Vermin-proof! Most insulations offer no protection at all against vermin in food processing, storage or handling operations. Rats and other vermin gnaw right through them. FOAMGLAS, on the other hand, affords an excellent vermin barrier. Its all-glass composition offers no food or nesting materials for vermin.



Strongest! FOAMGLAS has a compressive strength of over 7 tons per square foot (av. ult.). It forms a solid base for built-up roofing. It makes possible the placing of insulation beneath heavily loaded floors. And high strength FOAMGLAS permits such cost saving design innovations as free standing walls and partitions.



Acid-proof! There is often a lot of acid around a processing operation. Even the atmosphere around processing plants frequently has a high acid content. Acids will attack and destroy most thermal insulating materials, but they won't harm FOAMGLAS. This unique all-glass material is completely impervious to all common acids.

Visit our Booth, No. 2123, at the Plant Maintenance Show, Cleveland

CORNING

For more facts circle 524 on Reply Card

FILLED TEFLON* BEARINGS

Chempro Filled-Teflon Bearings are tougher, harder, more wear-resistant and less subject to thermal expansion with the addition of specific filter compounds to virgin Teflon. Ideal for pumps, mixers, reactors and similar equipment where a chemically inert, non-corrosive, non-contaminating and non-adhering bearing material is a must.

Chemical & Power Products offers a complete Filled-Teflon Bearing service, including Chempro Finished Bearings either Pressed in Housings or without Housings, or Chempro Filled-Teflon Molded Tubes for machining bearings in your shop. Complete machining instructions furnished.

CHEMPRO FILLED TEFLON STYLES

FM-2	Glass-Filled Teflon
FM-3	Carbon-Filled Teflon
FM-4	Glass and Carbon-Filled Teflon
FM-5	Ceramic-Filled Teflon
FM-8	Graphite- and Zircon-Filled Teflon
FM-9	Molybdenum Disulfide and Glass-Filled Teflon
FM-10	Mica- and Glass-Filled Teflon

Write for Bulletin CP-558.

*duPont trademark

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N. Y.

For more facts circle 525 on Reply Card

BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

PL.E. Goes Astray

PLANT ENGINEERING:

"We have been receiving your publication, but have misplaced the October, 1958 issue. Or didn't receive it. Our engineering department has been making up a file of the articles on how to buy. As a result, they are missing section three which tells how to select bidders, instructions on bidding and proposal forms. We wonder if you could send us a copy of this article or an October issue." *Robert Van Bensichem, Assist. Purchasing Agent, Fort Orange Paper Co., Castleton-on-Hudson, N.Y.*

▸ Another copy of our October issue has been mailed to this reader with the compliments of the editorial department.—*Editors.*

The Editor Explains

PLANT ENGINEERING,

Attn: Tom Hanson, Editor

"Dear Tom: Thank you very much for sending me the tear sheet of the article on the machine for hardfacing of curved surfaces. This is an excellent presentation of this material. I was somewhat disappointed, however, not to see a credit reference to the Lincoln Foundation." *Charlie Herbruck, Assist. Secy., The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio.*

▸ Dear Charlie: I deserve an all-time place on the Goof Squad. Sorry that I muffed the ball. So, here in front of the whole congregation, I give credit to The James F. Lincoln Arc Welding Foundation for the excellent article mentioned above (PLANT ENGINEERING, November, 1958, pages 121 and 122). It won't happen again —at least with this article.—*Red-Faced Tom.*

De-Scaling Tool

PLANT ENGINEERING:

"We read with great interest the article that appeared in the October, 1958 issue of PLANT ENGINEERING, on page 113, on the subject of 'De-Rusting, De-Scaling Pistol'.

"We know that air chisels are commonly used for heavy duty cleaning requirements, but this is the first we have heard of sharp pointed needles in an air hammer type tool. It sounds interesting and we are wondering if you can furnish us with descriptive literature, price and delivery information on this tool." *John P. Meyer, Buyer, Purchasing Dept., Philadelphia Quartz Co., Philadelphia, Pa.*

PLANT ENGINEERING:

"I noted with a great deal of interest the article in PLANT ENGINEERING for October, 1958, concerning the Von Arx de-scaling pistol. This article was quite timely as far as we are concerned because we are faced with a large amount of chipping and scaling preparatory to painting in our dyehouse. I would certainly like more literature, name of dealer and prices, if these are available." *W. T. Carpenter, Plant Engineer, Dublin Finishing Co., Dublin, Va.*

▸ The many requests we have received for further information on the Von Arx de-scaling pistol have been forwarded to Mr. P. J. Vomouras of The Marindus Co., 52 Wall St., New York 5, N.Y.—*Editors.*

More Requests for "Specifications"

PLANT ENGINEERING:

"Would you kindly send me your 16-page copy of section A, 'General Conditions' for contracts." *E. V. Lewis, Plant Engineer, American Optical Co., Southbridge, Mass.*

PLANT ENGINEERING:

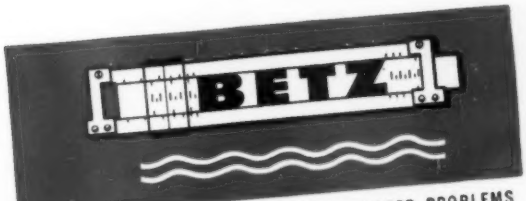
"Please send booklet, 16-page copy of section A, 'General Conditions' as mentioned on page 112 of the September issue of PLANT ENGINEERING." *M. L. Dinnhaupt, Building Maintenance Engineer, Aluminum Co. of America, Edgewater, N. J.*

PLANT ENGINEERING:

"I read with interest the articles in the August and September issues of your magazine prepared by R. E. Wallin on 'Specifications.' I would like to accept your offer listed in the September issue of two copies of Section A, entitled 'General Conditions' as well as full size reproductions of the bulletins shown in Figures 1, 2, 3 and 4. Both sets should be sent to my attention.

"I intend to circulate one copy to interested engineering personnel throughout the Plant and retain one copy in my engineering office files. The points raised in these articles constantly face us in all engineering

what's your plant water problem?



CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

BETZ LABORATORIES, INC., Philadelphia 24, Pa.

MAKE YOUR OWN
HERC-ALLOY
CHAIN ASSEMBLIES
with all components furnished from your distributor's stock.

CM
Hammerlok®
COUPLING LINK
• NO PEENING
• NO WELDING
• Hammerlok is made of alloy steel . . . is stronger than Herc-Alloy chain . . . is thoroughly field tested.
• Write for literature or ask your industrial distributor about Hammerlok.
• Made by the makers of Herc-Alloy . . . the original alloy steel chain.
COLUMBUS McKINNON
CHAIN CORPORATION
TONAWANDA, NEW YORK
DISTRICT OFFICES: NEW YORK
CHICAGO • CLEVELAND
In Canada. McKinnon Columbus Chain Limited, St. Catharines, Ontario
CM
HOISTS AND CHAIN
For more facts circle 527 on Reply Card

BACKTALK—FORETHOUGHTS

work and I certainly appreciated the excellent manner in which Mr. Wallin has treated his subject." *Leo J. Bandiera, Works Engineer, Aluminum Company of Canada, Ltd., Kitimat, B.C.*

Repairs With Glass Cloth, Liquid Resin

PLANT ENGINEERING:

"We are interested in obtaining the address of the Narmco Resins and Coatings Company. Their glass fiber cloth and liquid resin coating was noted in an article on page 54 of your September, 1958 issue.

"This information will be greatly appreciated as we have several applications for this product." *Michael Santulis, Project Engineer, Firth Sterling, Inc., Pittsburgh, Pa.*

▶ The application mentioned in our story was for the repair of eroded pump vanes. The material is made by the Narmco Resins & Coatings Co., 600 Victoria St., Costa Mesa, Calif.—*Editors.*

Wet Film Gage

PLANT ENGINEERING:

"Who makes the wet film thickness gage shown on page 116 of the November, 1958 issue of PLANT ENGINEERING, referred to in the article 'Preplan Your Painting Program'?" *Kenneth R. Moehl, Simplex Paper Corp., Jacksonville, Fla.*

▶ The gage mentioned in our article is used primarily to control the thickness of the paint film during application. It is manufactured by the Nordson Corporation of Amherst, Ohio. It costs about $6.00.—*Editors.*

Radio Communication in the Plant

PLANT ENGINEERING:

"Can you supply us with the names and addresses of firms manufacturing personal paging systems?

"This is the system described in your magazine some time ago which uses a small transistorized receiver about the size of a hearing aid amplifier, carried in the pocket by key personnel. A tone signal is sounded when the person's number is dialed or keyed at the master station. He is thus alerted to call the master station for his message.

"Only the receiver of the person being paged is sounded. I am advised that some systems permit one way conversation, while others sound only the signal.

"I have looked through the back issues of PLANT ENGINEERING but have, thus far, been unable to find the article I refer to." *W. T. Hill, Foreman, Electronics and Radio, Temco Aircraft Corp., Greenville, Texas.*

▶ "Two Problems — One Answer: Two-way Radio," which appeared in September, 1958, PLANT ENGINEERING, is the article for which Mr. Hill is looking. The equipment mentioned in the story is made by Motorola Inc., Communications and Electronics Div., 4501 West Augusta Blvd., Chicago 51, Ill.

Another, light-weight, two-way radio system has been announced by the Radio Corporation of America, Communications Products Div., Camden 2, N.J.—*Editors.*

AC Motors for V-Belt Drives

PLANT ENGINEERING:

"Referring to your November, 1958 issue, page 102 and the article by R. A. Nailen, Westinghouse Electric Corp., entitled 'How To Specify and Apply AC Motors to V-Belt Drives,' we would appreciate very much receiving about 20 reprints of this article. If the reprints are not available, we would appreciate receiving 20 copies of the issue.

"We will appreciate greatly you sending either one or the other to us and billing us for the cost of same." *C. N. Hultberg, Vice President, Sales, California Pellet Mill Co., Crawfordsville, Ind.*

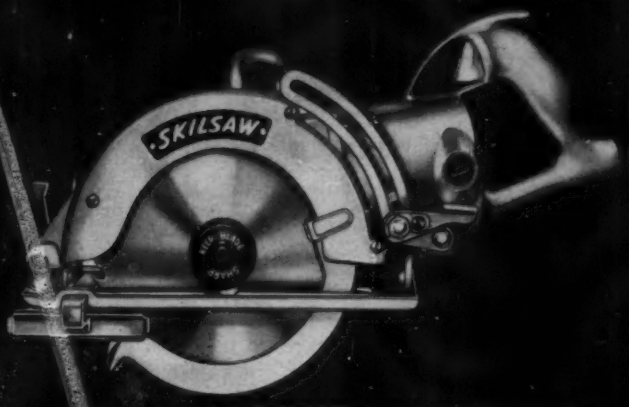
▶ Reprints of this article are not available, but tear sheets are—and they will be sent free of charge to any reader wishing to receive copies.—*Editors.*

A Raison d'Etre

PLANT ENGINEERING:

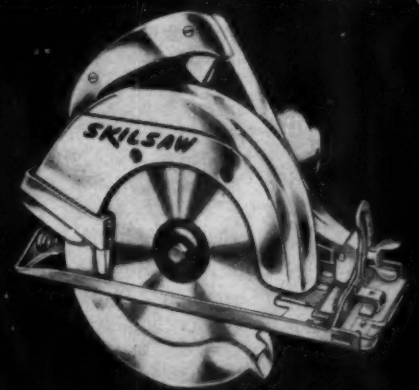
"It seems as if everyone in this department, from engineer to draftsman, has need for one or other of your articles. The number of tear sheets requested, therefore, is far from few, but we hope you can help us out with as many as possible. [List enclosed]" *H. J. Upson, Plant Engineering and Layout, Remington Rand Univac Div. of Sperry Rand Corp., St. Paul, Minn.*

▶ We are quite unabashed at such popularity—in fact we thrive on it—so we hope readers will never hesitate to send in requests for tear sheets, even if the list is "that long."—*Editors.*



HI-TORQUE, **super-duty SKILSAW**—In-line rear handle and left-hand blade allows you to see line of cut. Exclusive hi-torque worm drive gives exceptional cutting power. Tough to stall anytime. Super duty saws with rear handle design come in eight models from 6½" to 12".

NEW HI-SPEED, **super-duty SKILSAW**—Completely new top-handle design for easy "swing-through" cuts. "Floating" blade guard and fast blade-change are exclusive new features. A total of 14 special features which add up to the most exciting new saw on the market today. Top-handle design available in 7¼" and 8¼" models.



ECONOMY MODEL, **heavy-duty SKILSAW**—Designed specifically for all-around use by carpenters or contractors in residential construction. Lightweight. Versatile. All heavy-duty models feature exclusive "Vari-Torque" clutch. Protects against blade kickback. Keeps motor in top running condition. There are four heavy-duty models with blade sizes from 4½" to 8¼".

WHICH SKIL SAW works best for you?

more proof of SKILMANSHIP*
ONLY SKIL MAKES ALL THREE

For more than 30 years SKIL has pioneered in the design of saws to meet the special needs of builders. Now, we offer the widest choice ever with the addition of a top-handle saw. Only from SKIL can you choose from three types. And remember this —no matter which model you buy, you always get the same superior performance that has made SKIL saw the favorite saw in the building field.

**SKILMANSHIP* is the ability to offer the finest portable saws for over 30 years—saws that do any job better, faster, easier.*

SKIL

Made only by SKIL Corporation, manufacturer of famous SKIL and SKILSAW products, 5033 Elston Avenue, Chicago 30, Illinois. In Canada: 3601 Dundas Street West, Toronto 9, Ontario.

For more facts circle 528 on Reply Card

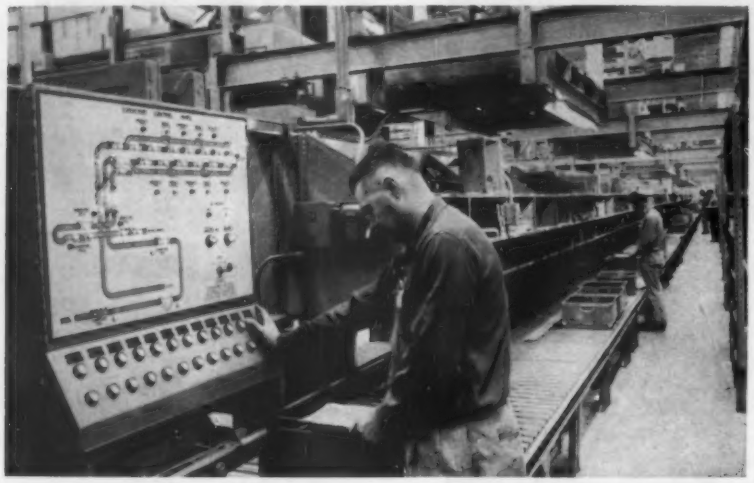
PLANT ENGINEERS' DIGEST —so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Coordinated Conveyor System Carries Equipment Through All Rebuilding Operations

AUTOMATIC ROUTING of parts and equipment is handled at the new Solon, Ohio plant of Western Electric Co., by a coordinated system of live roller, gravity roller, belt, roller flight and truck towing conveyors. Placed in aluminum trays, parts and equipment are automatically transported through all necessary rebuilding operations and directed to the appropriate warehousing areas by means of pre-set pin deflectors on the trays.

Efficiency of order picking has been increased by collecting the order in a hamper placed on top of a special carrier. If more than one hamper is required for it, the additional units are placed on the conveyor behind the carrier and travel to the same destination. Before order picking begins, a dispatcher reviews the order and sets the carrier's tabs to activate the deflectors so that the unit will be discharged at stations where pick-ups are to be made.



Control panel at dispatcher's station shows activity on entire conveying system.

The carrier and hamper travel through the order selecting process on a belt-driven live roller conveyor line. Paralleling this conveyor is a gravity roller line onto which the carrier and hamper are shunted to receive articles. After all items have been gathered at a particular station, a slight push moves them back onto the live roller conveyor.

Carriers are returned to the dispatcher for reuse on a combination belt and roller conveyor line. *From a release of The Alvey-Ferguson Co., Cincinnati, Ohio.*

Tool Deburrs Bolt Holes In One Pass

ONE TROUBLESOME handling problem at Chrylser Corporation's Lynch Road plant in Detroit was the deburring of bolt holes on banjo housing faces, where the differential housing is bolted on.

Original deburring procedure called for hand removal of the banjo housings from the overhead conveyor. The housings were placed on a table-top fixture, the holes deburred on both sides with an air-driven, right-angle deburring tool.

Deburring a 10-holed housing, for instance, required 20 passes with the right angle tool, 10 of them on the "invisible" or inner side. Then, the housing was replaced on the conveyor by hand.

Now, the same job is handled with a Cogsdill deburring tool, called a Burraway, in only one pass per hole, while the housing is moving by on the conveyor.

The tool has a spring-loaded, double-edged cutter. To deburr the holes, the operator merely inserts the air-driven tool in the hole, shoves it through, and pulls it out. One side of the cutter (the leading edge) catches the exposed face on the in-stroke; the other side of the cutter (the trailing edge) catches the back face on the out-stroke. *From a release of Cogsdill Tool Products, Detroit, Michigan.*

One pass with new tool chamfers both faces of bolt holes on banjo housing.

Tough Steel Bite

A "TOOTH" MADE of high-yield strength constructional alloy steel, has been built into high-lift tractor buckets used to scoop up semi-molten slag under and around open-hearth furnaces at our Homestead District Works.

Combined with a prow-shaped bucket "lip" made of the same steel, the tooth has extended bucket life by at least 400 per cent and has reduced bucket costs by two-thirds.

The new bucket was designed by

For qualities beyond your specifications —

CONDULETS*...

made only by Crouse-Hinds

You'll find Condulet electrical equipment in two out of three plants across the country. It's there because electrical engineers have discovered that it provides *more* than standard performance.

And no wonder. Only Condulet rigid conduit fittings have all these features:

✓The wedge-nut cover fastener.

✓Longer hubs for a better wrench grip.

✓Taper tapping to match ASA standard tapered conduit threading for a rigid joint that will not loosen.

✓A triple long-lasting finish that exceeds Federal government and U.L. specifications.

✓A smooth, integral bushing to protect cable insulation.

✓Feraloy, a special alloy that is strong, resists corrosion, and gives full, sharp threads.

For installations where aluminum, plastic or plastic-coated conduit is used, we can supply either copper-free aluminum or plastic-coated Condulet fittings as required.

● *Next time you order, specify Condulet equipment. From the simplest fitting to complex motor controls, the name "Condulet" and the Crouse-Hinds trade-mark are your assurance of receiving the finest.*

CROUSE HINDS

MAIN OFFICE AND FACTORY: SYRACUSE, NEW YORK

Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

● CONDULET® ELECTRICAL EQUIPMENT (Explosion-Proof and Conventional) ● FLOODLIGHTING ● TRAFFIC CONTROL SYSTEMS ● AIRPORT LIGHTING and WEATHER MEASURING EQUIPMENT

* CONDULET is a coined word registered in the U.S. Patent Office. It designates a brand of products made only by the Crouse-Hinds Company.

These products are sold exclusively through electrical distributors. For application engineering help, contact one of the following offices: Baton Rouge Birmingham Boston Buffalo Chicago Cincinnati Cleveland Corpus Christi Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Omaha Philadelphia Pittsburgh Portland, Ore. Salt Lake City St. Louis St. Paul San Francisco Seattle Tulsa Washington **Resident Representatives:** Albany Atlanta Baltimore Charlotte Chattanooga Jacksonville Reading, Pa. Richmond, Va. Shreveport

For more facts circle 529 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

Frank J. Barsic, maintenance general foreman in the Homestead transportation and general services department.

The company was faced with reducing bucket costs when it was determined that buckets were being replaced every three weeks at a cost of more than $3000 each. The trouble with the old style buckets was that the lip could not dig into the hot slag without subjecting the bucket and the tractor to excessive stresses. As a result, bucket and tractor often sustained considerable damage.

High-strength steel was then used in a bucket lip, shaping the lip into a shallow V. After welding the new lip, the wedge shaped tooth was added, the narrowest part of it being extended beyond the V of the lip.

Tough steel tooth is used in bucket that removes slag from around furnaces.

Because the tooth is positioned in the center of the bucket, stresses are distributed evenly to the tractor's high-lift mechanism as the bucket digs into the slag.

The abrasion-resistance of the alloy steel enabled the lip and tooth of the first modified bucket to survive three months of rugged operating conditions without failure in either the steel or the welds. The task of modification was simplified because the steel requires no post-welding heat treatment.

Labor and material for each bucket modification cost about $1100. *From a release of United States Steel Corp., Pittsburgh, Pa.*

Industrial Ovens "Bake" Fuel

SOLID PROPELLANT charges for guided missiles are being "baked" like biscuits in a recently-installed battery of industrial ovens.

The fuel, a polysulfide polymer, is heat-cured to a black rubbery

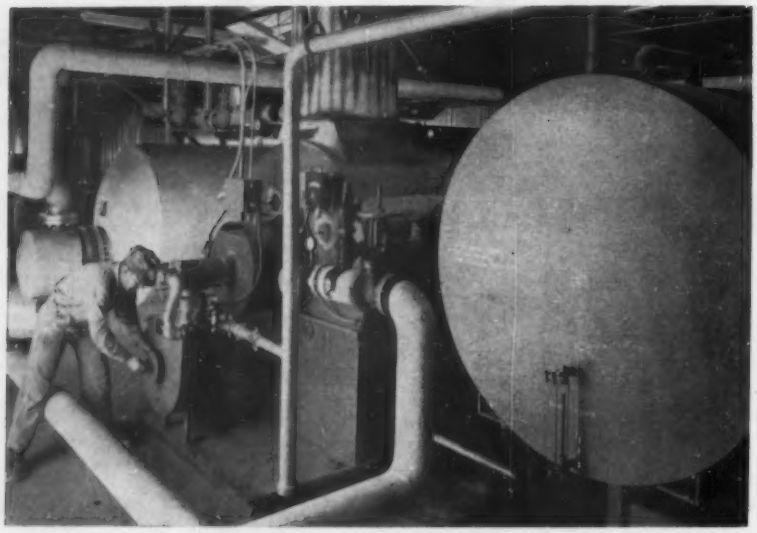
(Continued on page 40)

Hot Oil Heat Transfer System Solves Steam Contamination Problem

WHEN THE U. S. Durox Corp. of Colorado started to produce gas concrete structural blocks, at their Englewood, Colo. plant, they had the problem of providing uncontaminated steam for the final production step—steam curing the blocks in autoclaves.

If the municipal water supply were treated with chemicals to prevent boiler scale, the chemicals carried over into the steam would contaminate the gas concrete which is made with silica sand, lime, water, cement and aluminum powder. Also, after the steam curing, the condensate is contaminated by the gas concrete and cannot be returned to a boiler.

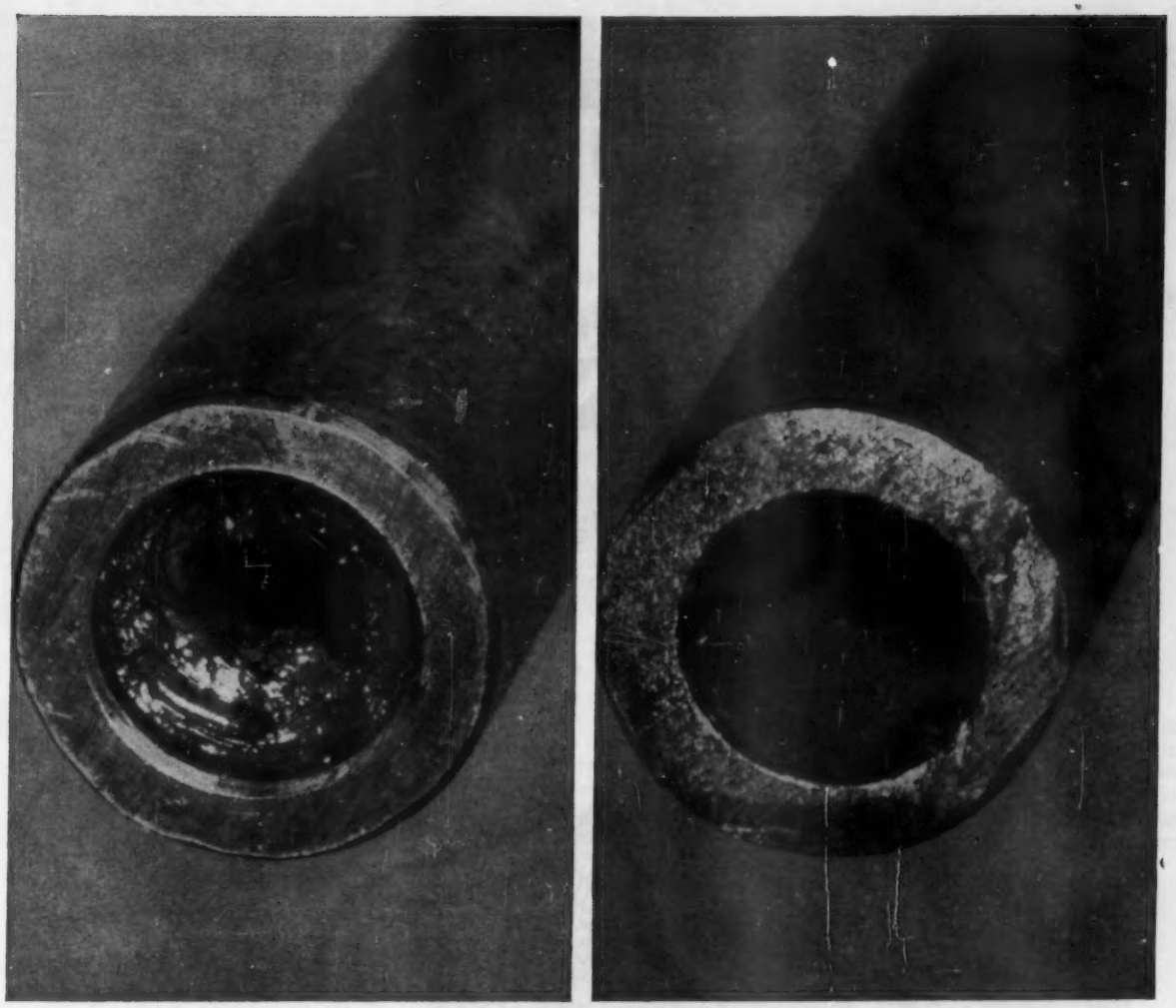
The development of a two-stage steam generator which does not eliminate scale but which does prevent product contamination, was the solution. A natural gas-fired heater heats refined heat-transfer oil to 500 F. Feed water is pre-heated to about 200 F by double jacket surge and expansion tanks containing the hot oil, which is pumped through a heat exchanger. Here, the hot feed water is converted into steam at about 150 psig at the rate 11,000 lb per hr.



Two-stage steam generator consists of oil heater, being adjusted by mechanic, surge tank (foreground) heat exchanger, steam generator, and expansion tank.

The untreated water forms scale on the heat exchanger walls and exterior of the tubes, but the unit is easily disassembled for scale removal. Using oil as the heat transfer medium meant transmission through a 4-in. pipe line to the steam generator then to the surge and expansion tank. This piping was covered with 1½-in. thick calcium silicate pipe insulation with a pasted canvas finish. Calcium silicate block, also 1½ in. thick, insulates the surge tank and heat exchanger. Oil is returned to the system for recirculation to the heater without additional pre-heat.

The 6-in. steam pipes to the autoclaves are insulated in similar manner to the other piping. *From M-S Insulation Reporter, published by The Magnesia-Silica Insulation Manufacturers Assoc., Washington, D. C.*



This sludge-clogged hydraulic line . . . looked like this, after cleaning with a Sunvis 700 oil.

With Sunvis 700 oils, you can clean hydraulic systems and keep them clean

Sludge, caused by high temperatures, and by water, dirt, cutting oils, paint, packing, and by many other contaminants, clogs lines and cuts efficiency.

Sunvis* 700 oils keep these contaminants in suspension, and carry them away to the filters, thereby keeping systems clean and preventing costly shutdowns. In fact, many seriously fouled systems can be cleaned and kept clean permanently by a switch to Sunvis 700 oil. A single charge of Sunvis 700 oil can keep even a continuously contaminated system running smoothly for months, often *years*.

Your Sun man knows Sunvis 700 oils inside out. He has facts, figures, and case histories that prove their quality... quality that means *money in your pocket.* Call him in soon. Or write to Dept. PY-1.

Industrial Products Department

SUN OIL COMPANY, Phila. 3, Pa.

SUNOCO

*TRADEMARK

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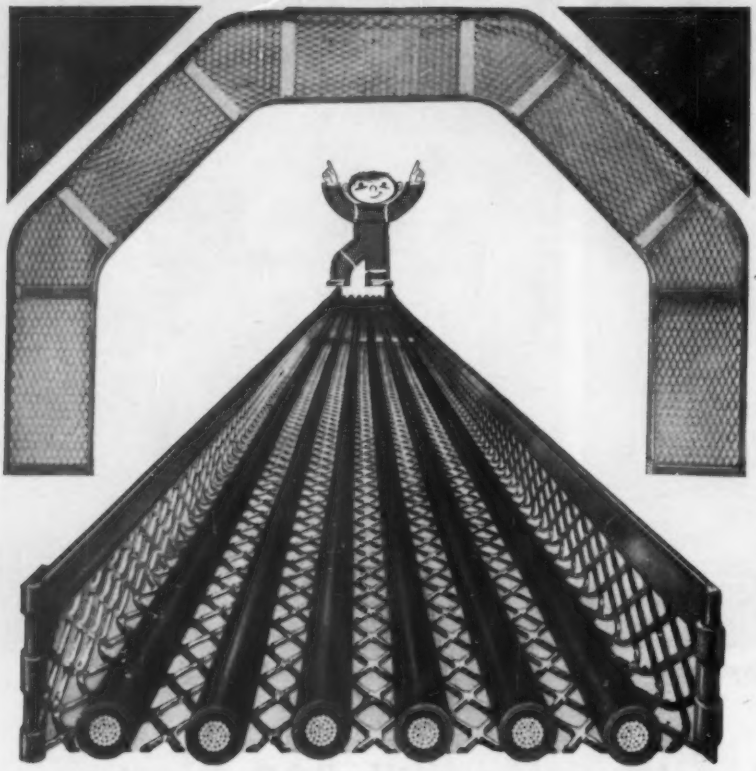
In Canada: Sun Oil Company Limited, Toronto and Montreal

For more facts circle 530 on Reply Card

THIS IS COPE WIREWAY

for Power Cable Distribution



ASK FOR PROOF!

On your next power cable installation—no matter how small—the man to see is the authorized Cope Electrical Wholesaler near you. For more complete information or assistance on special designs, write to T. J. Cope Division, Rome Cable Corporation, Collegeville, Pa.

- **Strong, Lightweight Expanded Metal Construction for Maximum Ventilation.**
- **Supports *More* Cables in *Less* Space than Conduit.**
- **Over *1,000* Standard Items—Straight Sections, Fittings, Accessories—for *Any* Plant Layout, *Large* or *Small*.**
- **Provides for Simplified, Low Cost System Expansion.**

WIREWAY • CABLE LADDER & CHANNEL • SYSTEM SUPPORTS & ACCESSORIES

COPE DIVISION

ROME CABLE CORPORATION

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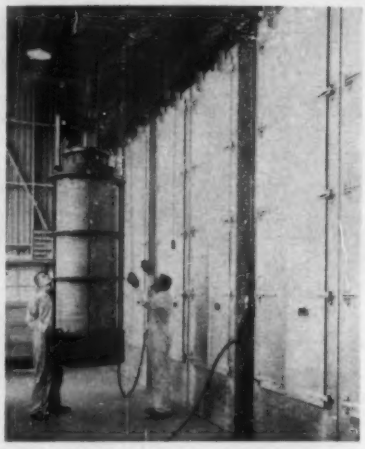
PLANT ENGINEERS' DIGEST

(Digest begins on page 36)



Rocket engine, ready for "baking" is shown before being loaded into oven.

solid in a final stage of rocket engine production at Marshall, Texas, plant of Thiokol Chemical Corp. The curing operation takes place in steamheated ovens, operating in the temperature range of 100 F to 200 F.

The liquid polymer, once only a basic ingredient for gasoline and oil hoses, is mixed with an oxidizer to become both fuel and binder for the charge. A thin coating of propellant is sprayed in the casing and cured in the ovens, then a core is inserted in the rocket engine casing and the main charge is poured around it.

After the entire engine is "baked," the core is withdrawn and the rocket is ready to fire. Shape of the hole left by the core determines the planned burning rate for the rocket. *From a release of Despatch Oven Co., Minneapolis, Minn.*

Safety Slogans

A SAFETY CAMPAIGN through matchbook advertising to employees has been launched by E. I. du Pont de Nemours & Co., Inc., at its Savannah River Plant operated for the U. S. Atomic Energy Commission.

Twenty different cartoons under the matchbook covers illustrate various safety messages: "Report all injuries, no matter how small"; "No

For more facts circle 532 on Reply Card →

WRIGHT HOISTS & CRANES

FOR LONGER LIFE • EASIER MAINTENANCE
LOWEST FINAL COST

ACCO

WRIGHT *SPEEDWAYS*

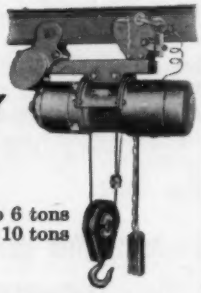
Available with single, 2-speed or variable speeds and with a wide variety of mounting arrangements

2-SPEED *SPEEDWAY* FRAME 1

Capacity ¼-ton to 1 ton. Two-speed, 1800/450 RPM motors permit precise, gentle positioning of work at slow speed... fast lifting and lowering at high speed.

***SPEEDWAY* FRAME 1½**

4-part reeved. Capacity to 2 tons ...relatively slow lifting speeds.

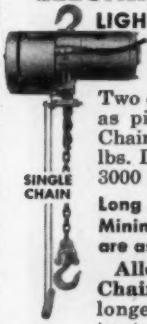


***SPEEDWAY* FRAME 2 FRAME 3**

Capacities—
Frame 2, ½-ton to 6 tons
Frame 3, 4 tons to 10 tons

NEW WRIGHT ELECTRIC CHAIN HOISTS

LIGHT—COMPACT—RUGGED—LOW COST



Two capacity ranges as pictured. Single Chain—300 to 2000 lbs. Double Chain—3000 to 4000 lbs.

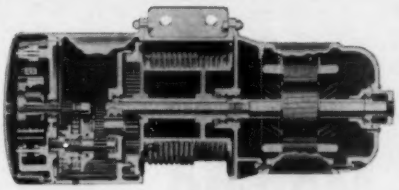
Long Life—Safety—Minimum Maintenance are assured by—

Alloy Steel Load Chain wick-oiled for longest life...heat-treated for long-wearing surface and ductile shock-resistant core—**Load Wheel, Hooks** and **Hook Couplings** drop-forged alloy steel—**Precision Ball Bearings** and **Gears** operate in oil bath—**Double Braking**—**Fewest Moving Parts.**

These Features make WRIGHT *SPEEDWAYS*

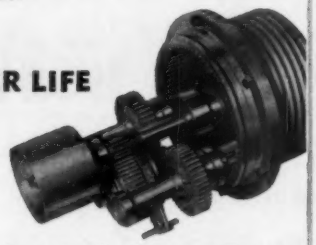
Capacities ¼-ton to 10 tons

your best buy for— MORE PRODUCTION



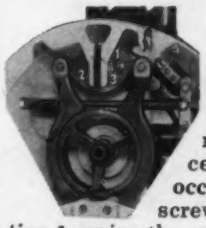
Fine balance and heavy-duty design make possible the continuous handling of tough jobs on any duty cycle for which a 30 minute NEMA motor is satisfactory. All gears and pinions are alloy steel, heat-treated. Their ductile core is shock resistant to severe service stresses. Anti-friction bearings throughout.

LONGER LIFE



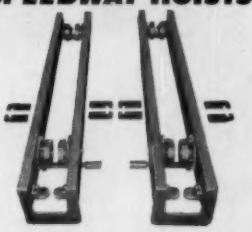
Strength of gear teeth of WRIGHT Frame 2 and Frame 3 *Speedway* Hoists has been doubled by a change in contour and grain structure of the metal. Internal gear ring with heavy flange cross section is bolted to drum at six points and provides extreme resistance to distortion.

EASIER MAINTENANCE



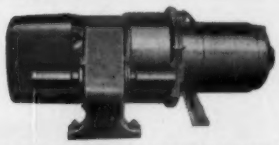
There is "*Nothing to Adjust but the Cam*" to keep the motor brake in perfect adjustment. When excessive load drift occurs...remove the screw shown at Position **1**, swing the cam until Position **2** is in line and replace the screw. Position **3** is provided for the final one-third of brake lining wear. Brake springs and solenoid never need adjustment!

Build Better Cranes Save Money too! with WRIGHT END TRUCKS CRANE DRIVE UNITS *SPEEDWAY* HOISTS



WRIGHT END TRUCKS

For motor-driven cranes and hand traveling cranes—both top-running and under-hung types. Timken Bearings throughout. Wide range of capacities up to 10 tons. Structural steel construction is lighter and stronger than cast frames.



WRIGHT CRANE DRIVE UNIT

For crane and double-beam trolley propulsion. Electric motor transmits power through fluid drive to well-proportioned gear reduction. Units are equipped with WRIGHT-designed solenoid "drag" brake. Size 1 Drive Unit has motors up to 2 HP...Size 2 has motors 3 HP to 7½ HP.

For Complete Information

Write for these Booklets—

DH-73A • New Electric Chain Hoist
DH-133D • Frame 1 *Speedways*
E-58 • Frame 2 & 3 *Speedways*

Motor Driven Cranes

DH-227 • Underhung, Single Bridge
DH-448A & DH-449A • Top-Running
DH-431C • Crane Drive Units

Wright Hoist Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

Choose the brand that offers the most...

magnificent Modine gas-fired unit heater

magnificent Performance
magnificent Economy
magnificent Styling

Easy on the eyes, easy on the budget! With stainless steel burners and a unique heat exchanger design, Modines provide quick, uniform heat . . . trouble-free, fuel-thrifty service. And these compact beauties are *up to 50% lighter than other makes* — cost less to ship, handle, install.

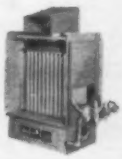
Eight models (25,000 to 310,000 Btu) are *available from stocking distributors in all principal cities.*

NEW CATALOG 658 *contains complete details on Modine gas-fired heating equipment. Ask your distributor or write Modine Manufacturing Co., 1563 DeKoven Ave., Racine, Wisconsin.*

GU-1378

2 more popular Modine gas-fired products

BLOWER TYPE UNIT HEATER — seven models, 50,000 to 310,000 Btu.



DUCT FURNACE — five models, 88,000 to 213,000 Btu.

In Canada: Sarco Canada, Ltd., Toronto, Ont.

Modine
FIRST NAME IN UNIT HEATING

For more facts circle 533 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

horseplay"; "Throw waste in cans"; "Lift with your knees bent"; "Signs are for your benefit," and others. In addition to plant safety, the series deals with traffic safety for drivers and pedestrians and one matchbook

These slogans on book match covers help keep employees safety conscious.

flap reads, "At home, too, use first aid"—all contributing to making employees safety-conscious.

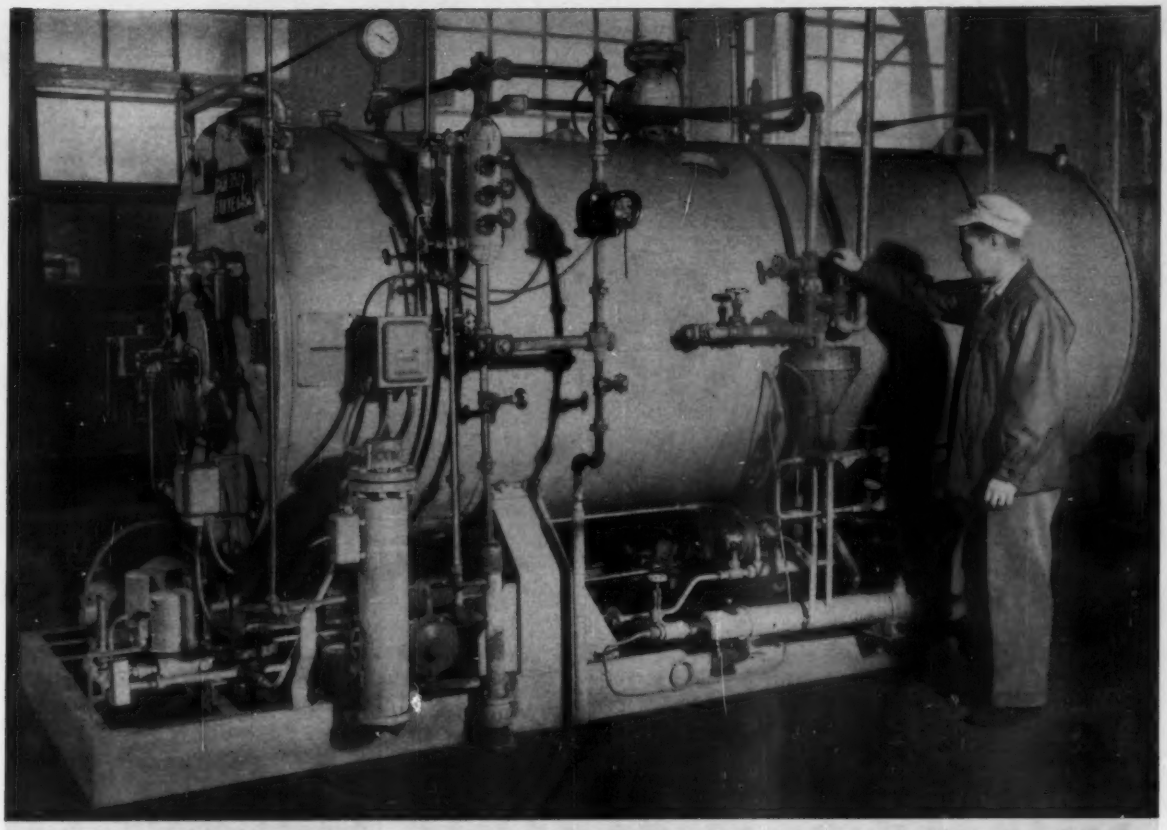
The outsides of all matchbooks are imprinted with the company and plant names, and the over-all theme of the campaign: "You control safety." *From a release of Lion Match Co., Inc., Long Island City, New York.*

Flexibility With Movable Walls

MOVABLE INTERIOR walls have enabled Sylvania Electric Products, Inc., to make changes to the

Movable walls have enabled Sylvania to make changes at Processing Center.

Data Processing Center in Camillus, N. Y., without disruption and



125 HP AMESTEAM GENERATOR Installation at Delaware and Hudson RR Diesel Shops at Binghamton, N.Y.

D & H R R ESTIMATES $30,000 ANNUAL SAVINGS WITH FOUR AMESTEAM GENERATOR AUTOMATIC BOILERS

"... we estimate $10,500 annual savings ... more than 44 percent return on our investment ... with the 125 HP AMESTEAM GENERATOR installation at our Binghamton diesel shops alone ..."

And that's only *one* of four AMESTEAM GENERATOR installations mentioned in a letter to us from Mr. P. O. Ferris, Chief Engineer of the Delaware and Hudson Railroad. Mr. Ferris goes on to say ...

"At the present time we have installed these generators at the following locations, at the estimated total annual savings of $29,899 shown:

LOCATION	H. P.	Estimated Annual Savings	Percent Return On Investment
Rouses Point	125	$ 8,350.00	33.2
Whitehall	200	6,841.00	22.3
Mechanicville	80	4,208.00	19.7
Binghamton	125	10,500.00	44.2
ESTIMATED TOTAL ANNUAL SAVINGS		$29,899.00	

What more can we add to this factual testimonial of satisfaction from the Delaware and Hudson Railroad? Only this: we have on file similar reports from hundreds of satisfied users of AMESTEAM GENERATORS. Among leading railroads alone, we number 40 satisfied customers ... using 194 of our economical, dependable "package type" boilers.

This all adds up to *your* assurance of savings and satisfaction with AMESTEAM GENERATORS.

AMES IRON WORKS INC.
BOX M-19 OSWEGO, N. Y.

WHAT'S YOUR STEAM PROBLEM?

For high-quality automatic package boilers, 10 to 600 HP, write us today for the name of your AMESTEAM GENERATOR Representative and our latest catalog.

For more facts circle 534 on Reply Card

For safer, easier equipment cleaning . . .

DRY ACID CLEANERS

based on Du Pont Sulfamic Acid

New cleaning compounds made with sulfamic acid are sold and handled *dry*—no hazardous liquids to ship or store. Dry or dissolved in water for use, they create no fumes. Yet these cleaners have all the penetrating power of hydrochloric acid with far less corrosive effect.

Sulfamic acid-based cleaners remove scale and deposits from air-conditioning and ice-making equipment, food-processing vessels, steam boilers, milk evaporators and pasteurizers, marine evaporators and heat exchangers. Cleaning action is fast, thorough.

We'll gladly send you more information on sulfamic acid-based cleaners and the names of formulators who offer these new compounds. Just mail the coupon below.

DU PONT
REG. U.S. PAT. OFF.
Better Things for Better Living
. . . through Chemistry

Du Pont
SULFAMIC ACID

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Dept., Rm. N-2533PE
Wilmington 98, Delaware

Please send me: ☐ sulfamic acid general equipment-cleaning bulletin; ☐ names of formulators offering cleaners based on sulfamic acid.

*Name*_____

*Company*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

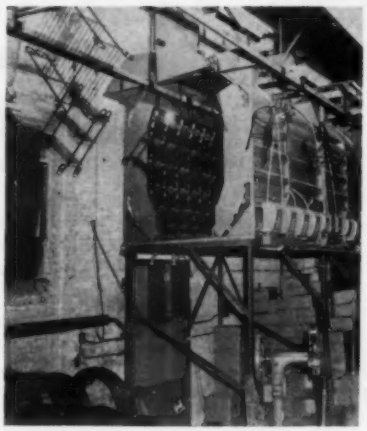
costly repairs to the complex communications equipment.

It was necessary in planning the Processing Center to have interior walls that could be relocated without creating dust and debris—a major hazard to the delicate computor equipment.

The 1252 lineal feet of Hauserman walls installed included 808 ft of wall composed of a 54 in. high steel railing and an 18 in. high top glazing and 444 ft of 7 ft 2½ in. all-steel partition with a double mineral board top filler.

Since the Data Processing Center was opened in 1956, a number of space changes have been made and, because of the movable walls, the cost for such changes have been minimized as well as the dust problem. *From a release of E. F. Hauserman Company, Cleveland, Ohio.*

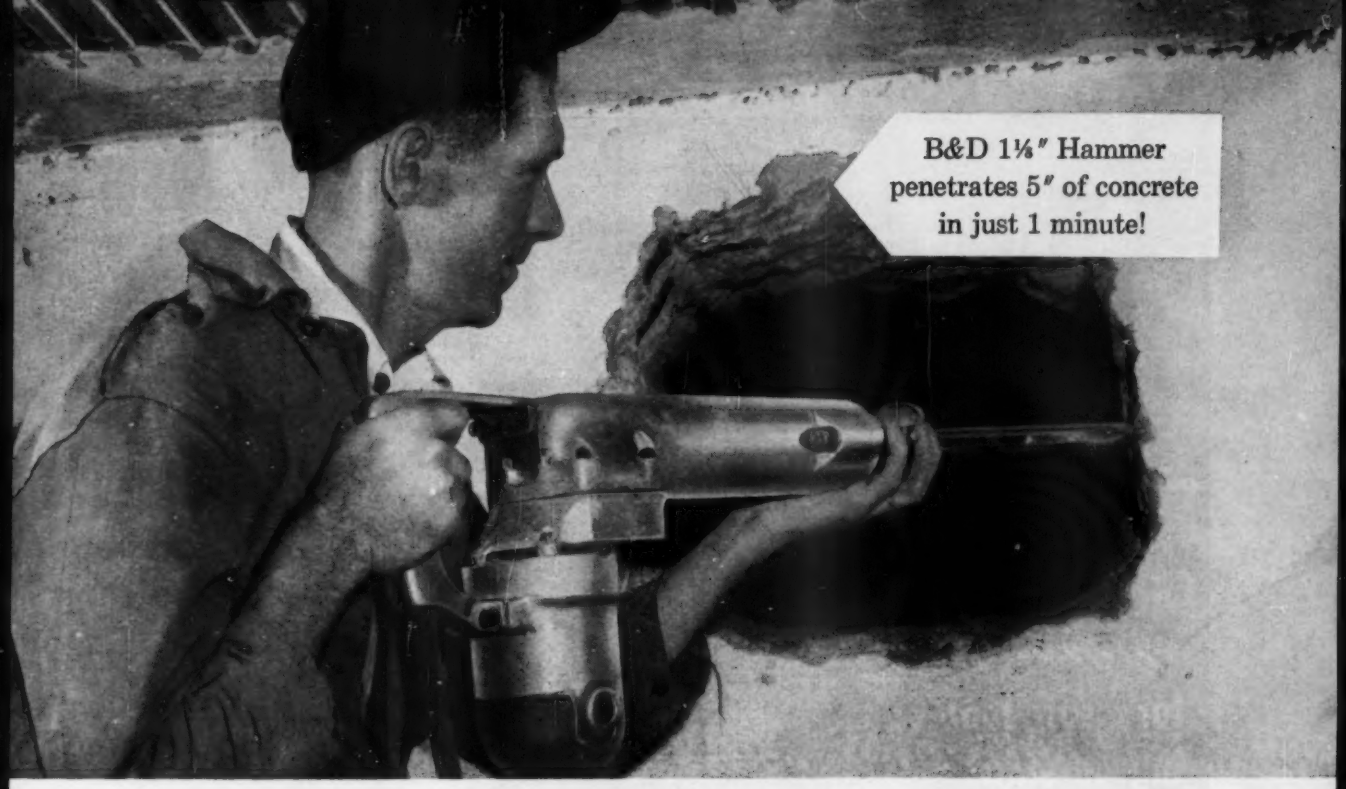
Overhead Oven Saves Floor Space



Chairs, stands and other furniture made from formed wire are coated with lacquer and dried in this ceiling-mounted infrared oven. By placing this oven overhead, the National Wire Products Corporation, Baltimore, Md., is able to use the floor space for storage. (From a release of the Fostoria Pressed Steel Corp., Fostoria, Ohio.)

Steel Pipe for Corrosive Liquid

TRICHLORETHYLENE, a highly corrosive solution, flows through a steel pipe in the automotive testing wind tunnel installation at the Research



11 times as much material removed 13 times faster than by hand!

Give your job a finished look with a Black & Decker Bushing Tool.

For the finest, and fastest work always specify genuine Black & Decker forged hammer tools.

Trenches for conduit are a cinch with a Black & Decker Cold Chisel.

Look for Swifty Service at one of B&D's 48 Factory Service Branches. There's one near you.

B&D 1⅛" Hammer drastically cuts cut-through time—labor costs!

Add a Black & Decker 1⅛" Hammer to your tool kit and watch how quickly it opens up your profit margin! It punches through concrete walls in minutes—opens the way for pipe and duct in a fraction of the time it takes by hand.

Plugs into any convenient outlet—the Black & Decker Electric Hammer takes on chipping, gouging, digging, caulking, pointing, and many other jobs! Mail coupon today for a free demonstration on your job-site! If additional information is desired just check the box.

Leading Distributors Everywhere Sell

Look Under "TOOLS-ELECTRIC" in Yellow Pages

Black & Decker®

Quality Electric Tools—Power-built to set the pace

MAIL TODAY FOR FREE DEMONSTRATION

THE BLACK & DECKER MFG. CO., Dept. 0801, Towson 4, Md.
(In Canada: Brockville, Ontario.)

☐ Please arrange a demonstration of your 1⅛" Hammer.
☐ Please send me additional information on tools checked.

Name..... Title.....

Company.....

Address.....

City..... Zone..... State.....

☐ Portable Grinders ☐ Drills ☐ Shears ☐ Jig Saws

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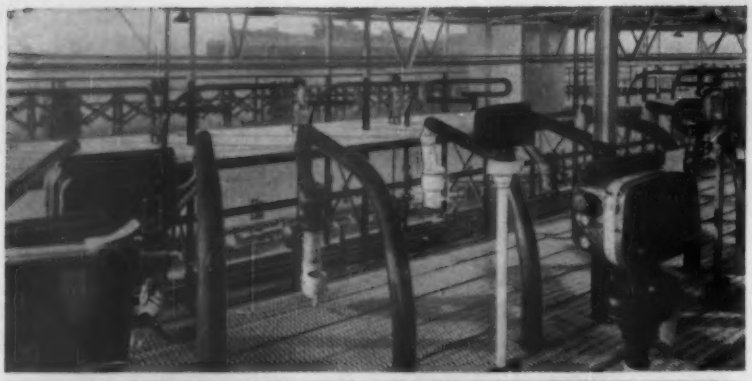
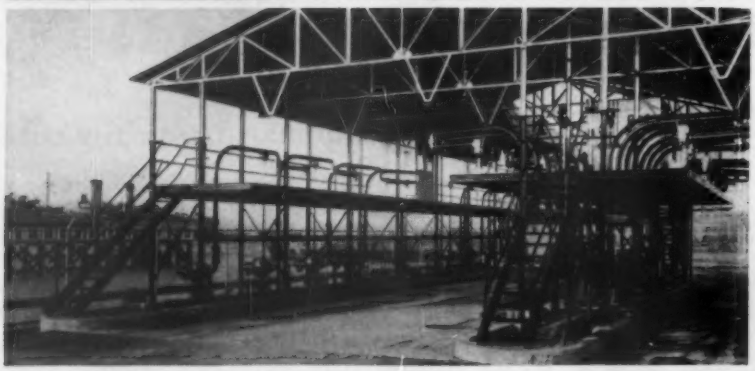
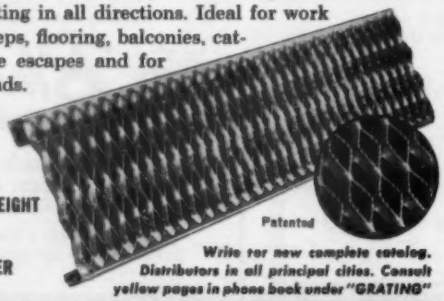




SAFETY GRIP-STRUT is the new basic material, all in one piece (including channels), not welded, riveted or expanded in steel or aluminum, in standard sizes and gauges. Safety GRIP-STRUT presents an open space, in a diamond pattern, in excess of 55% of the area for ready access of light and air and gives a positive NON-SKID footing in all directions. Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.



Important Safety Features

- FIRE PROOF
- SLIP PROOF
- MAXIMUM STRENGTH
- MINIMUM WEIGHT
- EASY TO STAND ON
- COOL IN SUMMER — WARM IN WINTER

107

Write for new complete catalog. Distributors in all principal cities. Consult yellow pages in phone book under "GRATING"

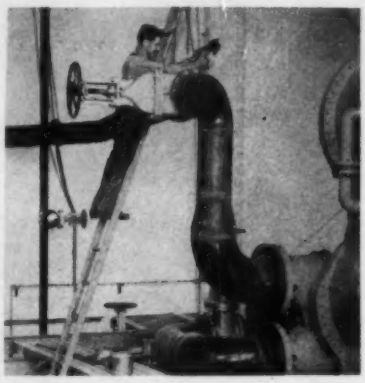
GRIP-STRUT

PRODUCTS DIVISION
The **GLOBE** *Company*
4016 S. PRINCETON AVE., CHICAGO 9, ILL.

For more facts circle 537 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)



Steel pipe carries brine used in cooling wind tunnel for automotive tests.

and Engineering Center, of Ford Motor Co., Dearborn, Mich.

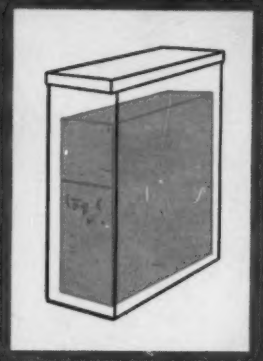
The pipe connects refrigeration machinery capable of changing temperatures in the tunnel from 150 F to —30 F within 60 minutes.

More than 5500 ft of pipe were used in the room for high and low pressure steam supply, steam condensate, municipal water, cooling tower water and compressed air lines, as well as the gasoline system. *From a release of The National Supply Co., Pittsburgh, Pa.*

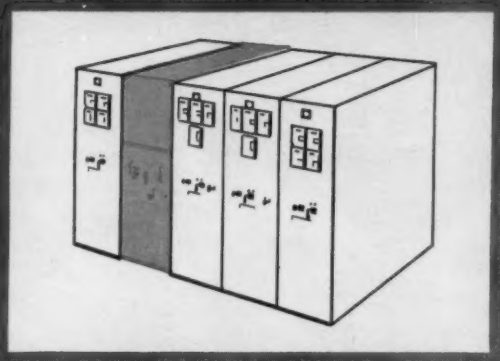
Still Rolling

Sharp-edged pistons covered with cutting oil are carried at Ford Motor Co.'s engine plant on Koroseal belt, still in good condition after year on the job. Belts used previously failed rapidly. (From a release of B. F. Goodrich Industrial Products Co., Akron, Ohio.)

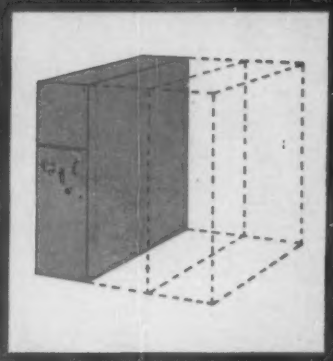
For more facts circle 538 on Reply Card



indoor or outdoor units



line-up with G-E Metal-clad



single or multiple units

Installation versatility with

General Electric ROLLOUT

Switch and Fuse Equipment

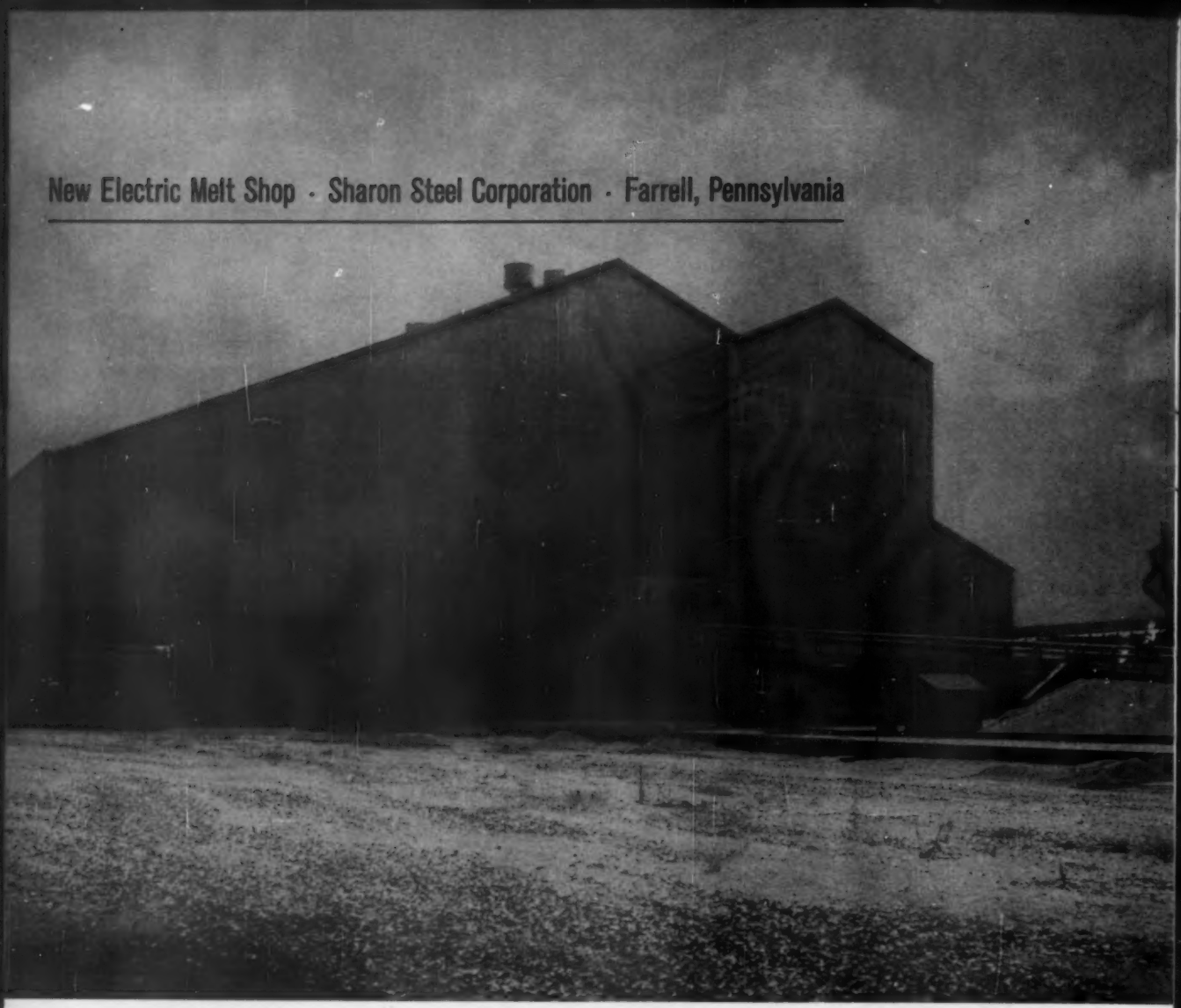
You have a choice of construction types with General Electric's Rollout Switch and Fuse Equipment. It can be furnished to suit your installation needs—indoor or outdoor units, single or multiple units, or in line-up with General Electric Metal-clad.

Whichever type of construction you select you get improved protection, greater safety, and ease of maintenance and inspection. For more information call your nearest General Electric Apparatus Sales Office or write for Bulletin GEA-6623, General Electric Co., Section E-514-5, Schenectady, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC

LINE-UP OF G-E ROLLOUT SWITCH AND FUSE EQUIPMENT with incoming Magne-blast circuit breaker now installed at Mission Valley Mills, New Braunfels, Texas. New equipment, rated 2.4 kv to 13.8 kv, is available in indoor or outdoor units, single or multiple units, or in line-up with Metal-clad switchgear.



FROM FOUNDATION TO

USS

American Bridge
Division of
United States Steel

FURNACE—an American Bridge job!

Sharon Steel's new electric melt shop at its Roemer Works in Farrell, Pennsylvania was built and delivered ready for operation by American Bridge.

American Bridge handled the entire job—from engineering . . . to foundations . . . to fabrication and erection of the building itself . . . to the installation of overhead cranes, utilities and all other operating equipment, including the 100-ton Heroult Electric Furnace.

The building is 277′ wide x 250′ long x 64′ to top of crane rails. It includes an 86′6″ x 200′ charging aisle, a 66′6″ x 250′ pouring aisle, an 87′8″ x 200′ scrap yard aisle, a 36′6″ x 175′ hot-top lean-to plus a 50′ x 50′ office and locker room. American Bridge also furnished and erected 3,300 sq. ft. of concrete-filled USS AmBridge I-Beam-Lok for truck ramp to charging floor.

This is the second big job we have done for Sharon Steel, having designed and built their new blooming mill building in 1956.

Whether you need complete new facilities, or only want to expand or modernize, discuss your plans with American Bridge. Our vast experience can help you reduce cost, time and trouble.

USS, AmBridge and I-Beam-Lok are registered trademarks

General Offices: 525 William Penn Place, Pittsburgh, Pa. Contracting Offices in: Ambridge • Atlanta • Baltimore • Birmingham • Boston • Chicago • Cincinnati Cleveland • Dallas • Denver • Detroit • Elmira • Gary • Houston • Los Angeles • Memphis • Minneapolis • New York • Orange, Texas • Philadelphia Pittsburgh • Portland, Ore. • Roanoke • St. Louis • San Francisco • Trenton • United States Steel Export Company, New York

For more facts circle 539 on Reply Card

YARWAY IMPULSE* is the only steam trap that continually samples fluid in the line to maintain condensate discharge close to steam temperature, eliminating condensate as soon as it forms.

Condensate seals the small control orifice against steam leakage under all normal operating conditions.

Here's why your best steam trap buy is Yarway Impulse—

1. GETS EQUIPMENT HOT FAST—AND KEEPS IT HOT
2. ONLY ONE MOVING PART
3. LOW MAINTENANCE
4. SMALL SIZE—LIGHT WEIGHT
5. GOOD FOR ALL PRESSURES
6. NON-FREEZING
7. COMPLETE LINE FOR EVERY REQUIREMENT

ONLY ONE MOVING PART, A SMALL STAINLESS STEEL VALVE, ACTUALLY "FLOATS" ON THE CONDENSATE LOAD.

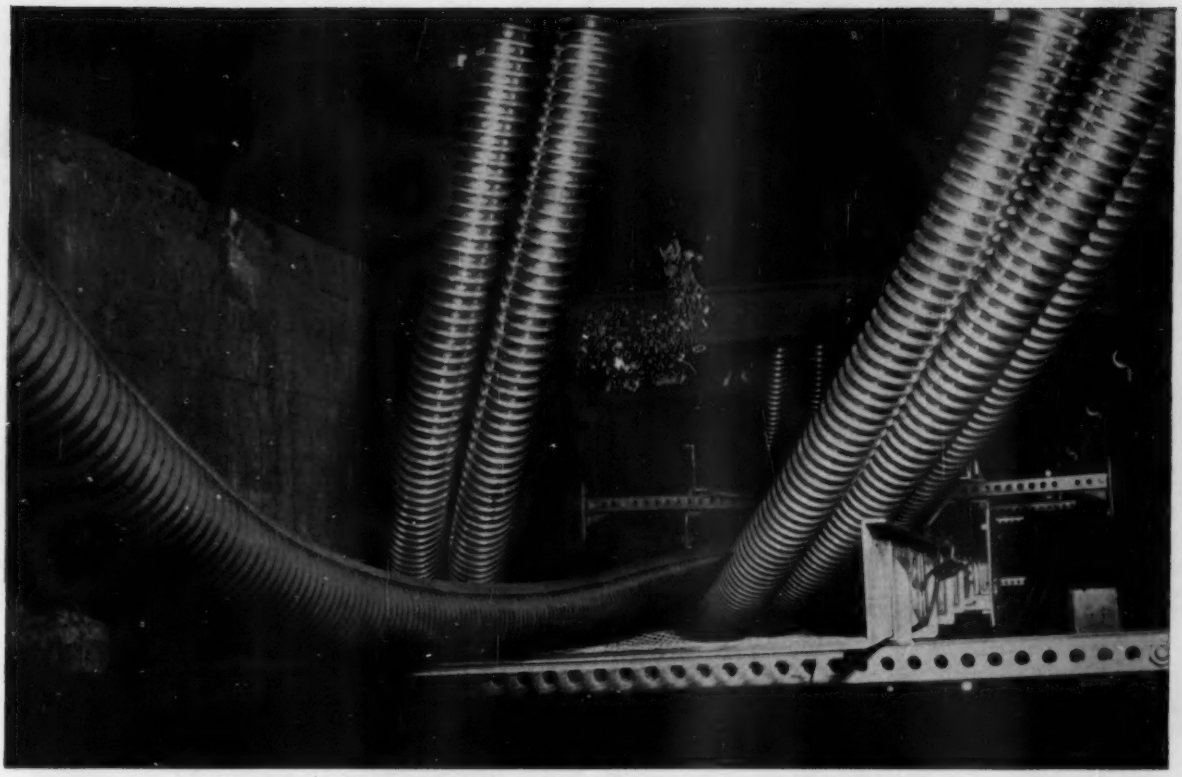
Actual size ¾" trap

* A COMPLETE LINE OF STEAM TRAPS, ALL OPERATING ON A PROVEN THERMODYNAMIC PRINCIPLE.

YARWAY impulse®

Manufactured by YARNALL-WARING CO., 145 Mermaid Ave., Philadelphia, Pa.
Stocked and sold by 270 Industrial Distributors
Write for free bulletin "The Why and How of Steam Trapping"

For more facts circle 540 on Reply Card



Quick identification for high voltage primaries is provided by an Okonite-developed, baked-on enamel finish in bright orange. In this access tunnel below transformer enclosure 3/c 15kv Okonex primaries are laid in same tray with 3/c 600v Okonex secondaries with plain aluminum Loxarmor. Plant and electrical system were engineered and designed by Southwestern Engineering Company. Electrical contractors were Trowbridge & Flynn Electric Company.

"Power supply is vital," said Diamond Gardner Corp. "We furnished Okonite cables," said Del E. Webb and SWECO

Here was an ultra-modern, completely integrated manufacturing operation where power failures could trigger a costly "chain reaction" in down time. That's one reason why Del E. Webb Construction Company and Southwestern Engineering Company furnished Okonite cables for extensive use in the new and unique mechanical pulping mill for Diamond Gardner Corporation's Integrated Forest Products Center at Red Bluff, California.

Another reason was SWECO's knowledge that The Okonite Company, because it alone makes cables by all methods, is uniquely qualified to help select the best cable for a specific circuit . . . and manufacture it to suit any installation conditions.

All primary and secondary power and control circuits in the plant are Okonite cables. For example: lightweight Okonex-insulated Loxarmor primaries, identified by an Okonite-developed bright orange, baked-on enamel finish, carry all power at 12kv to the twin transformer vaults in the plant. 600-volt Watertite-Loxarmor, 600-volt Okonex-Loxarmor and 5kv Okonex-Loxarmor, in racks, were selected for secondary distribution for their flexibility, low installation costs and the ease with which circuits can be added or re-routed. 600-volt Okotherm control cables were specified for circuits where high heat conditions are encountered.

Okonite quality . . . Okonite's ability to build cables by any method . . . and Okonite's expert design and installation assistance are factors to consider when ordering or specifying cables for your important installations. For more data on Loxarmor, write for free, 36-page Bulletin **PE-1090,** The Okonite Company, Passaic, New Jersey.

***where there's electrical power . . . there's* OKONITE CABLE**

6214

For more facts circle 541 on Reply Card

OPERATION AND PRODUCTION —pointers for the industrial plant engineer

Edited by Vern Kempf

Photo File Indentifies Engineering Patterns, for Easy Reference—also Saves Time and Money

Contributed by B. H. Griesbach, Engineer, Philip Morris Inc., Louisville, Ky.

STORING PATTERNS is a problem even in the best kept storeroom and being able to know what patterns are in stock and what they look like is sometimes an even bigger job. Our solution to this problem is to photograph each pattern with our Polaroid camera. All pertinent information regarding the pattern is typed on the back of the print.

The complete photographic file of all our patterns is kept in a small file in our engineering office. When a particular pattern is needed, a quick skim through the file shows us just what is in stock. The information on the back of the photograph also gives us the shelf and bin number where the pattern is stored and with the picture in hand, simplifies locating and identifying the desired pattern.

Photographs are filed alphabetically according to a description of the machine on which they are used. Information on the back of the photograph also includes the material to be cast, cost of the last order, the supplier's name plus any other pertinent information.

Photograph of a typical pattern as it looks in the photo file.

Patterns arranged alphabetically are easily located in this file.

Plastic Solves Roofing Problem

ADDING a waterproof membrane system was found to be the simplest solution to the maintenance problems caused by a deteriorated asphalt covered roof on a reservoir at Piedmont, California.

The membrane was built up by applying a combination of elastomer-treated coating and glass cloth. After the glass cloth was bound, a single top coating of green Rexkote acrylic polymer emulsion paint was applied by spray at the rate of ¾ gal per 100 sq ft.

Compatible with the asphalt beneath, the properties of the acrylic film render the surface water- and weather-resistant. At the same time, the nearly molecular sized pores in the film permit the evaporation of water vapor from the materials beneath the film and prevent blistering.

After one year exposure the paint has not faded, cracked or lost its weather-resistant properties. This application of an acrylic coating, formulated from Rohm & Haas Company acrylic emulsions, may lead to further use of this type coating on roofs and other asphalt surfaces.

Additive Breaks Up Oil Sludge

SUBSTANTIAL savings have been reported by a Du Pont plant in New York State where use of $50 worth of chemical additive has made it unnecessary to mechanically clean a 17,000-gal storage tank.

Using about three million gallons of No. 6 residual fuel oil per year, plant engineers found that sludge was building up to a depth of several feet in the tank so rapidly that two or three cleanings per year were necessary to maintain operations. Cleaning required opening the tank to remove the sludge manually. This was always a messy job.

Last February, about 80 lb of Du Pont FOA-2 were added to the tank in an effort to reduce sludging. Examination several weeks later showed virtually no sludge in the tank. Since that time, use of the additive on a quarterly basis has solved the sludge problem and eliminated manual cleaning operations.

Additive is generally added to fuel

quickest TO ERECT

quickest TO INSTALL

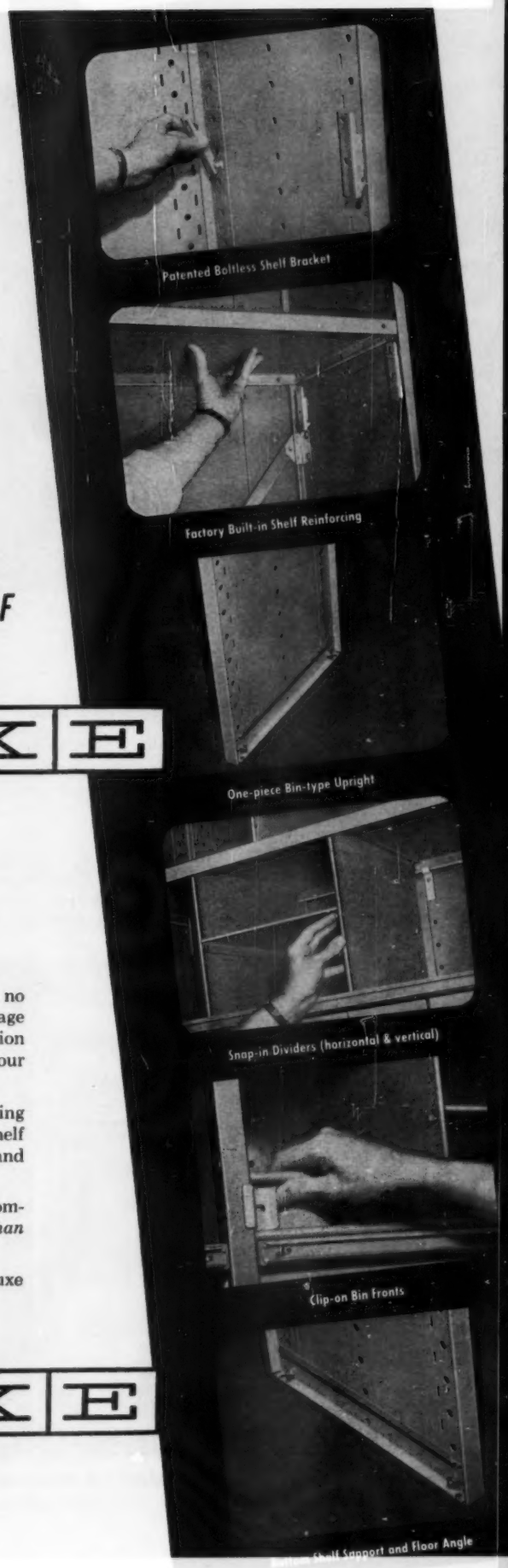
quickest TO RE-ARRANGE

quickest TO PAY FOR ITSELF

DELUXE

STEEL SHELVING

quickest BECAUSE...



. . . you realized that a shipment of knockdown shelving parts has no useful value. It must first be assembled into shelving racks for storage utility. The faster these racks are erected, the lower your installation cost. So, because Deluxe steel shelving is erected the quickest, your *installed cost* is the lowest.

The film strip shows 6 engineering features of Deluxe steel shelving that promote quickest erection. Take the patented Deluxe boltless shelf bracket . . . it replaces 90% of the time-consuming nuts and bolts and allows not only quickest installation, but easy shelf adjustment.

THE PROOF: At 1958 trade shows, two untrained girls erected a complete closed section of Deluxe Boltless Steel Shelving in *less than 5 minutes.*

Call your local Deluxe dealer or write for the new, complete Deluxe Shelving Catalog No. 30.

DELUXE

DELUXE METAL FURNITURE COMPANY · Warren 7, Pa.

A Division of the Royal Metal Manufacturing Company

For more facts circle 542 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 52)

oil in storage tanks at the rate of 20 to 40 lb per 1000 barrels of oil. This is equivalent to about one half to one pint of additive for every 1000 gal of heavy fuel oil.

According to Du Pont chemists, the additive, usable in all types of distillate fuel oils, breaks up the sludge into fine particles that become evenly dispersed throughout the oil and are burned in a normal manner.

Liquid Sealant Holds Bearing

REPLACING a nine-inch spherical roller bearing in the jaw of a rock crusher in less than an hour instead of the three to four days formerly required has saved $155 at the Acme Road Machinery Company, Frankfort, New York. These savings were made possible by mounting the bearing with a slip fit and retaining it with Loctite sealant instead of the interference press fit previously used.

Supplied ready to use, liquid sealant is applied to surfaces prior to assembly.

Emery paper is used to roughen the outside of the bearing and the inside of the housing. Grade A sealant is applied to both surfaces and the bearing assembled with a light push fit. Clearances are approximately 0.003 in. The sealant between the bearing and the housing starts to harden in thirty minutes and complete hardening takes place in 12 hours. According to information received from the manufacturer, the bearing is gripped more securely than with a press fit.

Tape Holds Small Parts

DOUBLE-SIDED pressure-sensitive tape solved a tough workholding problem in grinding brass feed discs at the Heald Machine Company, Worcester, Mass. The parts are es-

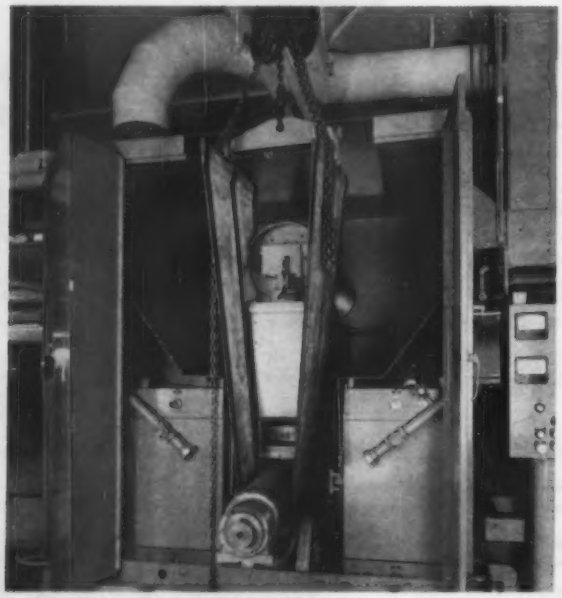
(Continued on page 56)

Plant-Developed Canvas Sling Simplifies Handling of Heavy Machine Rolls

HANDLING heavy machine rolls has been simplified by a method developed by engineers at Behr-Manning Co., Troy, N. Y. The new system reduces man-hours 80 per cent and cuts injury hazard to the vanishing point.

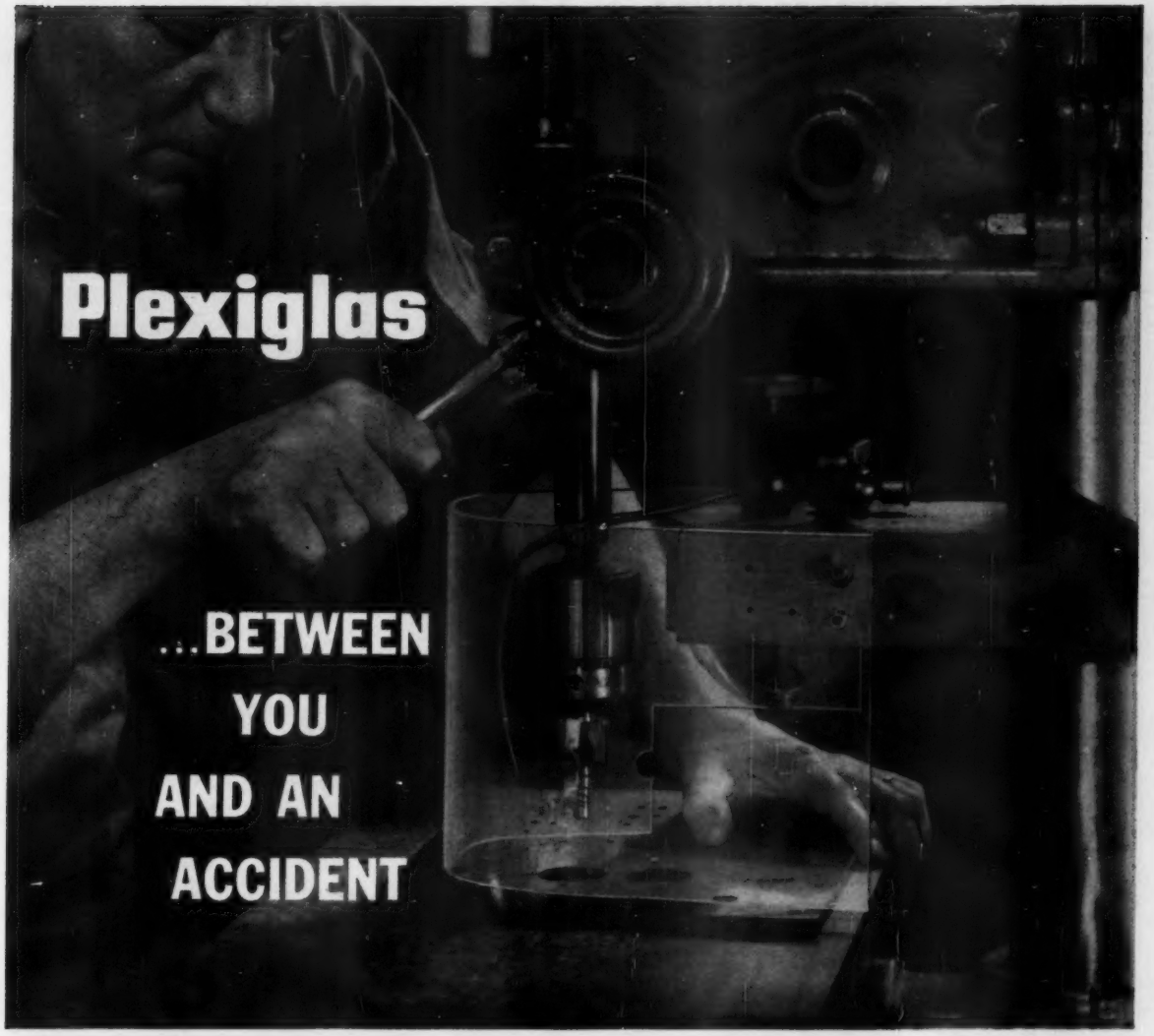
Consisting of a monorail hoist, a steel yoke an inch or two wider than the idler roll diameter and a canvas sling, the system is specially suited to removing worn contact rolls from abrasive belt grinders. With the sling in place under the roll, the hoist is used to lift slightly to clear the ends. The roll is then pulled forward, out of the machine and lowered to a dolly. The dollies are designed very low to prevent tipping.

The sling cradles the roll safely, preventing damage to rubber or other surfaces. It allows easy removal of journal bearings and permits thorough lubrication of bearing faces at each end. Total cost including several dollies was less than $700.



Monorail hoist and canvas sling support roll during removal.

Roll rests on cupped bearings on dolly to protect shaft ends.



Plexiglas can take it because it "gives" under the force of a blow. Note flexing at moment of impact.

When you want protection from flying objects, moving machinery parts or dangerous splash of acids and other chemicals . . . YET MUST SEE WHAT'S GOING ON . . . the answer is PLEXIGLAS® acrylic plastic.

Safety guards, protective covers, inspection windows, window glazing . . . all contribute to plant safety records and reduced maintenance costs. PLEXIGLAS is crystal clear. It resists breakage and most chemicals . . . is light in weight and easy to machine and handle.

Ask us for full information on the properties of PLEXIGLAS, clear and tinted samples, and the names of local dealers.

Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Canadian Distributor: *Crystal Glass & Plastics, Ltd., 130 Queen's Quay East, Toronto, Ontario, Canada.*

For more facts circle 543 on Reply Card

here's why SKILLED HANDS reach for

Snap-on® BOXOCKETS®

1 DESIGNED FOR SAFETY
Box or ring-type design provides maximum safety. Opening cannot spread, twisting force is applied equally to all corners of the nut.

2 SURE FIT
Snap-on double hex openings are machined to close tolerances to fit snugly without slipping.

3 CONVENIENT
Deeply offset heads, set at angle to handle, give clearance to reach countersunk nuts and knuckle-saving space over obstructions. Take a new grip with only 30° swing.

4 TIGHT QUARTERS
Thin walls permit wrench head to reach into tight places.

5 FAST
Chamfered openings help guide wrench onto nut or bolt head quicker.

6 MULTI-USE
Two sizes on each wrench.

7 COMFORTABLE
Rounded handle edges are easy on the hands.

8 EXTRA LEVERAGE
Long handles give plenty of direct line leverage for breaking tight nuts loose or pulling them up.

9 WIDE RANGE
Sizes, 3/8" to 1-5/8" in this type. Other types 3/16" to 4-5/8".

10 TOP QUALITY
Snap-on Boxockets are hammer-forged from finest steel and heat-treated to exact standards for long life under tough use.

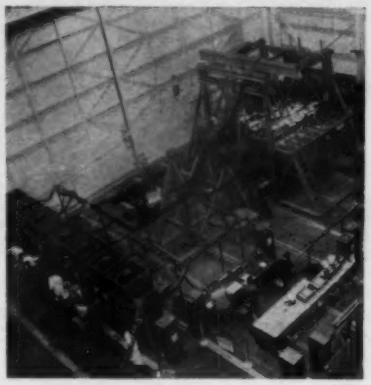
NEW SAFETY FILM
See the new *Snap-on* film, "Tool Safety." Write us and we'll have the nearest branch arrange a showing. Ask for new tool catalog.

SNAP-ON TOOLS
CORPORATION
2068-A 28th Avenue • Kenosha, Wisconsin

For more facts circle 544 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 52)



Quartz lamps supply heat for testing missile section at elevated temperatures.

automatically through computors to Ignitron control units which introduce correction factors into the system.

At present, temperatures up to 1800 F are possible. Before long the range will be extended by several hundred degrees to simulate re-entry temperatures and shock-wave temperatures of high-speed aircraft.

Tape-Controlled Welder Solves Production of Problem Parts

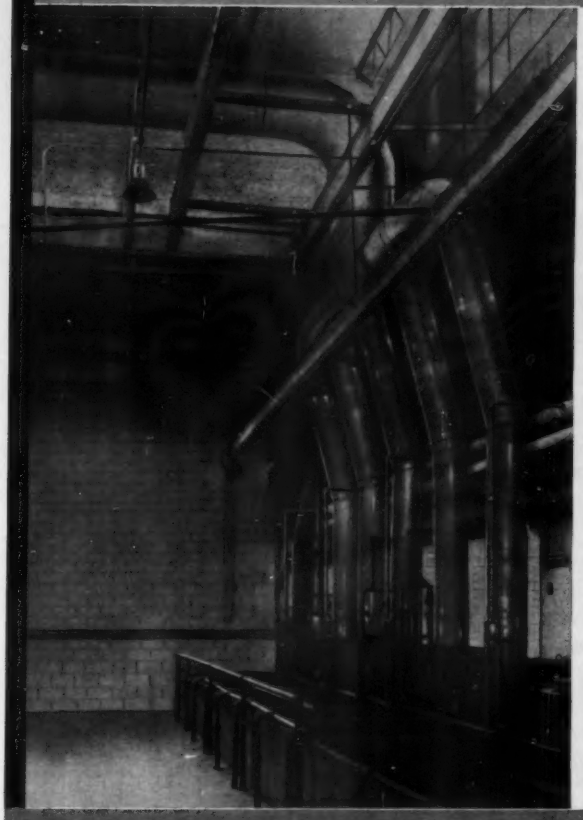
PROBLEM PARTS for surface-to-air guided missiles are being produced on a new tape-controlled, multiple-torch, Heliarc spot welding machine at the Convair Division of General Dynamics Corporation, Pomona, California.

Design of the parts prevented the

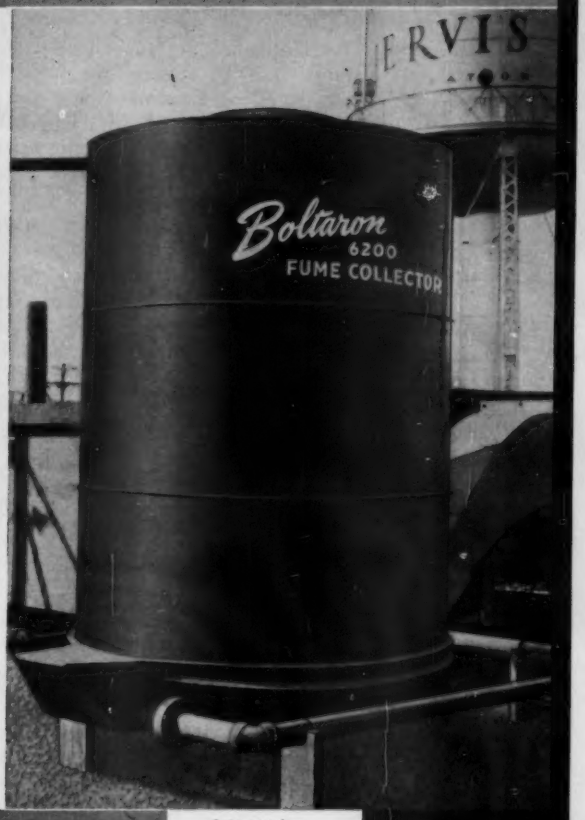
Tape control unit positions torches, tilts work to proper angle, and selects correct time and current for the weld.

The Carpart Corporation proves . . .

BOLTARON 6200 exhaust-system



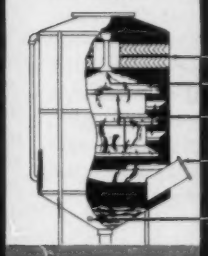
BOLTARON 6200 fume separator



Boltaron 6200

is the best answer for low-cost exhaust-systems & fume collectors

Cut-away view of Carpart's BOLTARON 6200 fume collector



Exhaust systems and fume collectors fabricated from BOLTARON 6200 outlast stainless steel, plastisol coated and fiberglass in handling acid and alkali fumes. BOLTARON 6200 fume collectors cost less than stainless steel . . . are corrosion resistant . . . maintenance free . . . 98.9% effective in removing soluble acids.

For further information on performance-proven fume collectors & exhaust-systems write: Carpart Corporation, 209 West Exchange St., Owosso, Michigan.

GENERAL® PLASTICS
The General Tire & Rubber Company

THE GENERAL TIRE & RUBBER COMPANY • Bolta Products Division • Lawrence, Mass.

For more facts circle 545 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 52)

sential components of feed boxes for internal grinders and must be ground to extreme flatness.

Because the brass parts could not be held on a magnetic chuck they were held in place with steel strips. This chucking operation held production to about 25 parts per hour.

A trial using double-sided pressure sensitive tape to hold the parts showed that this method worked

Magnetic chucks will not hold brass parts so double-sided, pressure-sensitive tape is used in this surface grinder.

very well. Not only did the tape simplify the chucking operation and reduce scrap to a negligible point but production increased 300 per cent. Parallelism is usually off slightly, about 0.0003 in., but it is not an important factor in this part. The technique has proved so successful that it is also used in some cases for grinding carbide tools.

800 F Produced by Quartz Lamps

UNDERGOING simulated flight condition tests in the Boeing Airplane Company's structural test laboratory is this section from an IM-99 Bomarc missile. The section being tested is subjected to varying loads at elevated temperatures.

Power for the quartz lamps supplying the heat is obtained from an electrical substation rated at 5750 kva. The heat control system is of the closed-loop type. Any error in the planned heat pattern is fed back

use of conventional resistance spot welding techniques since this method requires that both sides of a joint be accessible. The Heliarc spot welds are produced when a tungsten electric arc, shielded by inert gas, is applied to only one side of the joint.

Since heat from the torch melts the metals through the joints, the second side of the joint need not be accessible. This process is very useful for joining parts in which two or more surfaces must be welded to a core.

The basic welding machine has four torches, arranged so four parts may be welded at the same time. Hydraulic controls position the torches horizontally and they are raised and lowered pneumatically.

When operated by the tape program control unit, predetermined location and condition data for each weld are punched onto a tape. The tape is fed into the control system, which converts the data into command information for the machine.

Test Matches Paint Colors Fast

Contributed by S. Clark, Maintenance Supervisor, U. S. Phosphate Co.

MATCHING new paint colors to finishes which have faded is always a problem when painting buildings and equipment. Paint finishes do not always look the same when they are dry as when they are wet. This frequently results in a mis-match in color that spoils an otherwise good job.

To overcome this problem we have devised a method that shows in a few minutes how the paint will look when it is dry. This is accomplished by dropping a spot of paint about two inches in diameter on a piece of clean glass. After a few minutes, the glass is turned over. The color you see through the glass is the true color, since the finish next to the glass is dry.

Steel Replaces Broken Casting

MAKING a welded steel bracket to replace a broken cast iron bearing bracket for a chemical grinding machine saved Lincoln Electric three weeks downtime on the machine.

Starting with a short length of solid round stock, the hub of the bracket was bored to size and machined to accept bronze bearings. Cut in half, the bar stock provided

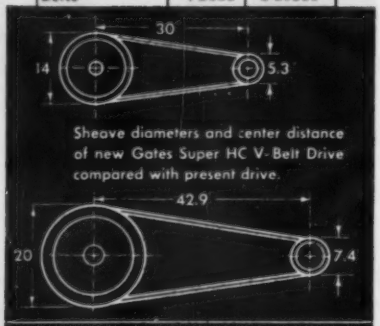
How savings multiply with new Gates Super HC V-Belt Drive

The cost of a new Gates Super HC V-Belt Drive is as much as 20% less than the cost of a drive of comparable hp using present V-belts. But the lower cost of the drive itself is only the initial *purchasing* economy.

Further economies are realized on drive equipment, such as housings and bases — economies in materials, production time, shipping costs.

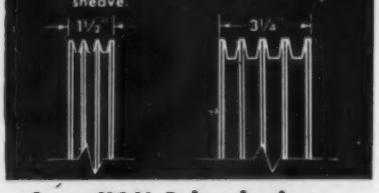
Shown below are space savings of a typical installation . . .

	Present Drive	Super HC Drive
DriveR Sheave	7.4	5.3
DriveN Sheave	20.0	14.0
Center Distance	42.9	30.0
Belts	4-B128	3-3V900



Sheave diameters and center distance of new Gates Super HC V-Belt Drive compared with present drive.

Face width of new Gates Super-V Sheave (left) compared with present sheave.

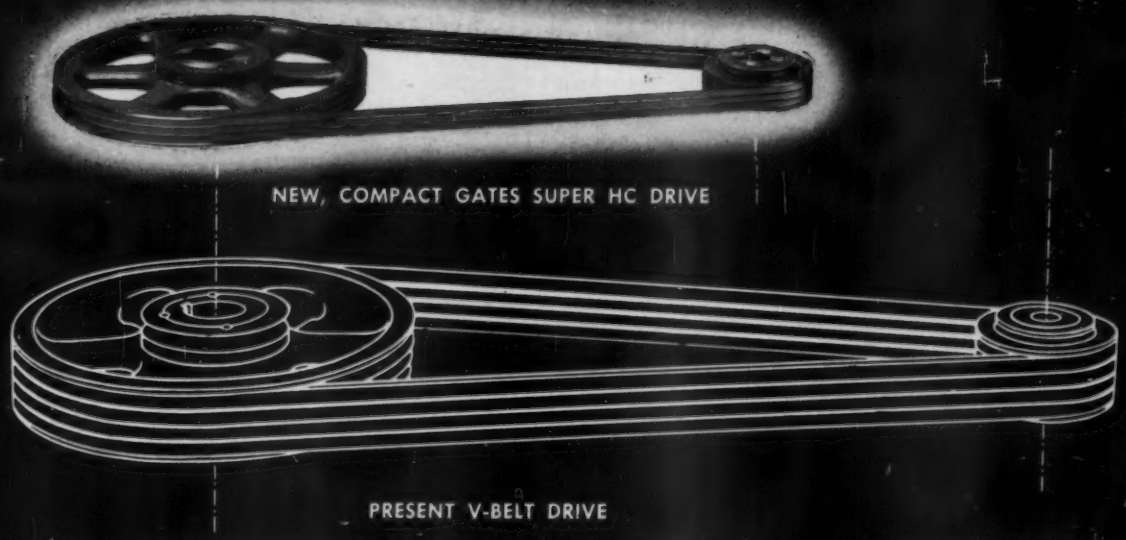


Super HC V-Belts also have these important Gates features...

1. **Flex-Weave Cover** (U. S. Pat. 2519590) A Gates exclusive. Makes cover more flexible . . . prolongs belt life.
2. **Concave Sidewalls** (U. S. Pat. 1813698) become straight as belt bends insuring uniform contact with sides of groove. Uniform contact means less wear . . . far longer belt life.
3. **High Electrical Conductivity** is built in for safer drives in explosive atmospheres.
4. **Oil, Heat and Weather Resistance** is insured by use of special rubber compounds.

Gates

New high capacity V-belt revolutionizes drive design



Makes drives far more compact... cuts cost as much as 20%

Here is a major advance in the field of power transmission — the fully proved Gates Super HC V-Belt, developed in the world's largest belt-testing laboratories at The Gates Rubber Company.

With the Gates Super HC V-Belt, you can have the lowest-cost, lightest-weight, most compact multiple V-belt drive you can put on any machine! Sheave diameters can be reduced up to 50%, sheave widths 30% to 50%, center distances 20% and more!

On new drives, the cost of a Gates Super HC V-Belt Drive is as much as 20% less than present V-belt drives of the same hp capacity!

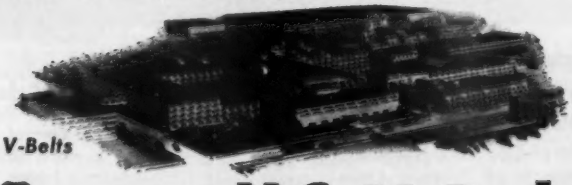
Learn More About The Cost-Saving Super HC Drive

For detailed information on the Super HC Drive, contact your nearby Gates distributor or Gates Office for new booklet, "*The Modern Way to Design Multiple V-Belt Drives.*" For utmost space, weight and dollar savings in new drives or drive replacements, specify Gates Super HC V-Belts and Sheaves. Stocks immediately available in principal industrial centers.

The Gates Rubber Company Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario

Gates

World's Largest Maker of V-Belts



Gates Super HC V-Belt Drives

For more facts circle 546 on Reply Card

AIR AND MATERIALS MOVING... OR VENTILATION WITH TROUBLE-FREE EFFICIENCY

"Buffalo" Industrial Exhausters

For many years these rugged "Buffalo" fans have been noted for dependable performance in hundreds of tough industrial jobs. They efficiently handle fumes, gases, fogs and dust, at temperatures up to 900°F. — move a wide variety of materials, including those carried by pneumatic systems — deliver induced draft for small boilers.

"Buffalo" Industrial Exhausters bring you many advantages:

● Peak Performance — thanks to smoother, more efficient air flow resulting from new "Buffalo" improvements in rotor and casing design.

● Adaptability — optional equipment includes interchangeable air or material wheels and heat slinger for high temperature conditions. Housing is easily reversible or adjustable.

● Built for Severe Service — with all-welded steel plate construction, and oversize anti-friction bearings and shafts.

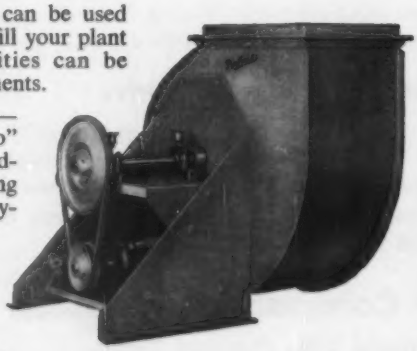
Write for Bulletin FI-110.

"Buffalo" Belted Vent Sets

These flexible "package" units are easily adaptable to your specific plant ventilating needs. They're economical to install, economical to operate. They're ideally suited for use in small, independent plant systems — for larger systems with variable requirements — for separate systems in different plant areas.

Check these advantages of "Buffalo" Belted Vent Sets:

● Compact, Easy-To-Install — can be used singly or as multiple units to fulfill your plant ventilating needs. Fan capacities can be adjusted to meet future requirements.



● Quiet, Efficient Performance — resulting from the famous "Buffalo" designed inlet vanes and backward-curved blades with non-overloading characteristic. Rotors are factory-balanced.

● Versatile — Capacities from 500 to 20,000 cfm. Available with all-weather drive cover for outdoor installation.

Write today for Bulletin 3720-A.

"Buffalo"

BUFFALO FORGE COMPANY
166 Mortimer Street ● Buffalo, N. Y.
Buffalo Pumps Division, Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
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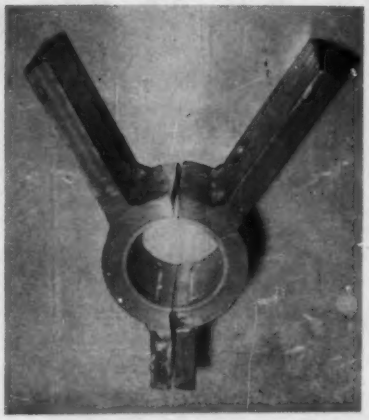
INDUSTRIAL EXHAUSTERS • BELTED VENT SETS • PROPELLER FANS • "E" BLOWERS — EXHAUSTERS

For more facts circle 547 on Reply Card

OPERATION—PRODUCTION

O & P begins on page 52



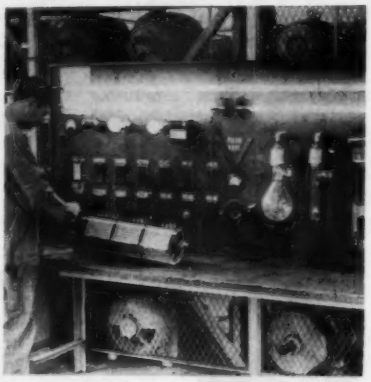
Completed bracket made in eight hours at half the cost of replacement bracket.

the hubs for the two bracket halves.

Flat bar stock, welded to the hubs, became the legs of the bracket. A hole was drilled through one of the legs on each bracket to provide access for lubricant. Fitted with the bronze bearings, the steel brackets were ready to use.

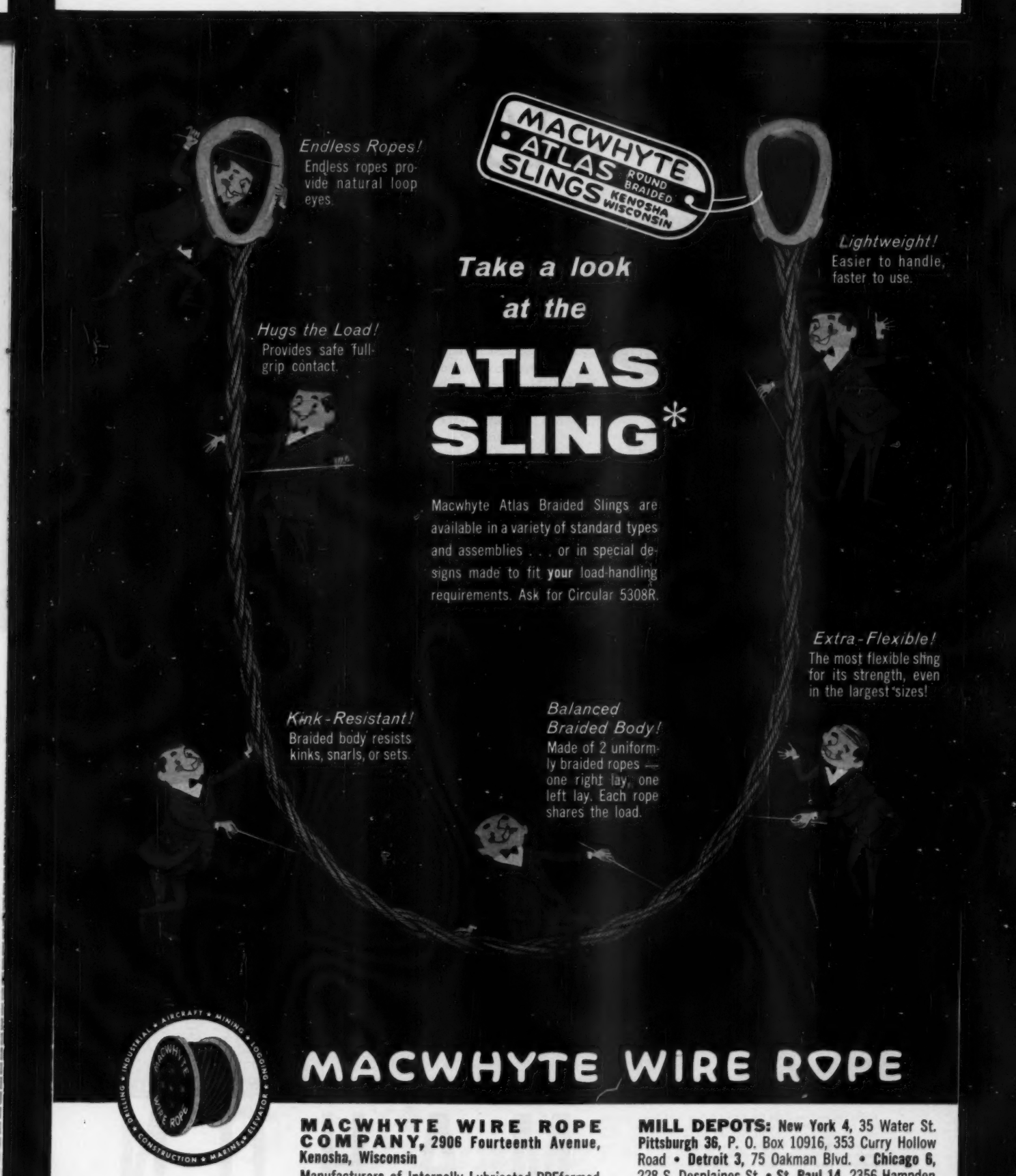
Total cost for the new steel brackets was $8.00 each as compared with $16.00 for a new cast bracket. The maintenance department made and installed the bracket in less than eight hours, compared to waiting three weeks for delivery of a cast replacement.

Testboard Simplifies Repairs



To facilitate maintenance and repair work, Calumet & Hecla engineers at Decatur, Alabama, devised this versatile testing arrangement. Consisting of a work surface and panel board on a iron frame, setup permits easy trouble-shooting and repair of the equipment.

For more facts circle 548 on Reply Card ⟶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Hugs the Load!
Provides safe full-grip contact.
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ATLAS SLING*
Macwhyte Atlas Braided Slings are available in a variety of standard types and assemblies . . . or in special designs made to fit your load-handling requirements. Ask for Circular 5308R.
Lightweight!
Easier to handle, faster to use.
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The most flexible sling for its strength, even in the largest sizes!
Kink-Resistant!
Braided body resists kinks, snarls, or sets.
Balanced Braided Body!
Made of 2 uniformly braided ropes — one right lay, one left lay. Each rope shares the load.

MACWHYTE WIRE ROPE

MACWHYTE WIRE ROPE COMPANY, 2906 Fourteenth Avenue, Kenosha, Wisconsin

Manufacturers of Internally Lubricated PREformed Wire Rope; Braided Wire Rope Slings; Aircraft Cables and Assemblies; Monel Metal, Stainless Steel, Plastic-Coated and Nylon-Coated Wire Rope; and Wire Rope Assemblies. Special catalogs available.

MILL DEPOTS: New York 4, 35 Water St. **Pittsburgh 36,** P. O. Box 10916, 353 Curry Hollow Road • **Detroit 3,** 75 Oakman Blvd. • **Chicago 6,** 228 S. Desplaines St. • **St. Paul 14,** 2356 Hampden Ave. • **New Orleans 2,** 144 Thalia St. • **Ft. Worth 1,** P. O. Box 605 • **Portland 9,** 1603 N. W. 14th Ave. **Seattle 4,** 87 Holgate St. • **San Francisco 7,** 188 King St. • **Los Angeles 33,** 185 S. Myers St.

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141

Rolling Steel Doors

Manually, Mechanically, or Electrically Operated

For new plants, and replacement in old plants, rolling steel doors offer the permanence of steel plus definite timesaving and space saving advantages in any type of opening. Whether it be a truck opening, railroad opening or shipping dock opening, the fast, vertical roll-up action of the door curtain requires no usable space either inside or outside the opening . . . there are no overhead tracks or other obstructions to restrict headroom or interfere with crane handling. And the all-metal construction of rolling steel doors reduces maintenance to a minimum and provides maximum protection against intrusion and fire. No other type of door can provide these important features which are so necessary for functional efficiency in door openings today. When you select a rolling steel door, check specifications carefully . . . you'll find, through comparison, that Mahon Rolling Steel Doors are built better to give you better service over a longer period of time. See Sweet's Files for complete information, including specifications, or write for Mahon Catalogue G-59.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago • Representatives in Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Underwriters' Rated Metalclad Fire Walls, Insulated Metal Curtain Walls, Electrified M-Floors, Acoustical and Troffer Forms, Acoustical Metal Ceilings, Steel Roof Decks, and Long Span M-Decks.

ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Above you see Five of the Ten Mahon Rolling Steel Doors installed in a new Plant for The Lamson & Sessions Co., Cleveland, Ohio. The Mahon Company also supplied the Structural Steel, Electrified M-Floors, Steel Roof Deck, and Aluminum Curtain Walls for this modern Manufacturing Plant. George S. Rider Co., Architects & Engineers; Sam W. Emerson Co., General Contractors.

MAHON

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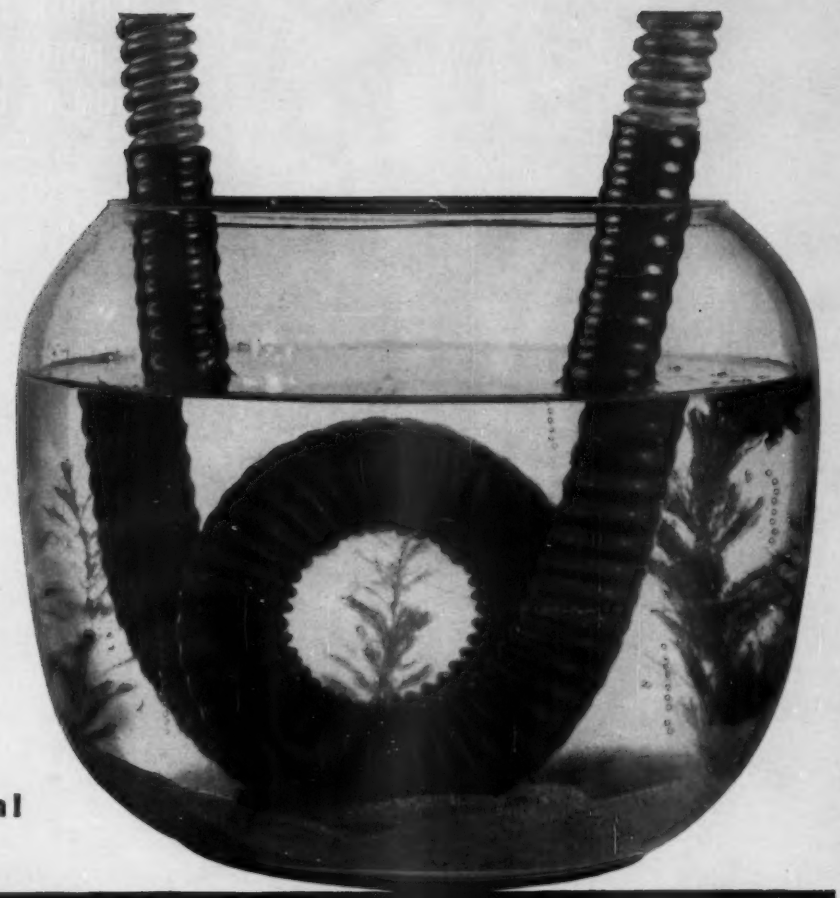

...it must be
C-L-X*
cable sheath!

Simplex C-L-X is a Continuous Lightweight Exterior corrugated metallic sheath. It is a *completely enclosed and impervious* cable system that possesses lightness, strength and a pliability that is limited only by that of the Simplex ANHYDREX, Polyethylene, PLASTEX or varnished cloth insulated cable it contains.

C-L-X combines the advantages of lead sheathed and interlocked armored cables, yet its great mechanical strength and impermeability is achieved with very little weight.

Countless installations over the past decade have proved the dependability and long life of C-L-X design — whether installed aerially or buried directly in the ground, or in trays.

*(Continuous Lightweight eXterior, pronounced "sealex")

Thermoplastic jacket may be color-coded for easy visual circuit identification or voltage ratings.

C-L-X continuous metallic sheath completely encloses the cable system.

C-L-X accommodates the Simplex built-in cable of your choice, for all kinds of power, control, signal and communication jobs.

LIVE BETTER ELECTRICALLY

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ANOTHER IN A SERIES
OF MOTOR FACTS
FROM ALL INDUSTRIES

"Roughest duty we have ever seen motors endure"

reports Marquette Iron Mining Co. of the Westinghouse Life-Line "A" motors in its Eagle Mills Pelletizing Plant

Operating continuously, 24 hours per day, dependable Westinghouse Life-Line® "A" motors drive a network of fans and conveyors at the Eagle Mills Pelletizing Plant of Marquette Iron Mining Co., Ishpeming, Michigan.

Some of these motors are located directly above a sintering machine where ambient temperatures often exceed 200° F and the motor is subjected to deposits of finely divided iron ore. Under these conditions, not a single motor breakdown or failure has occurred during 11 months of service.

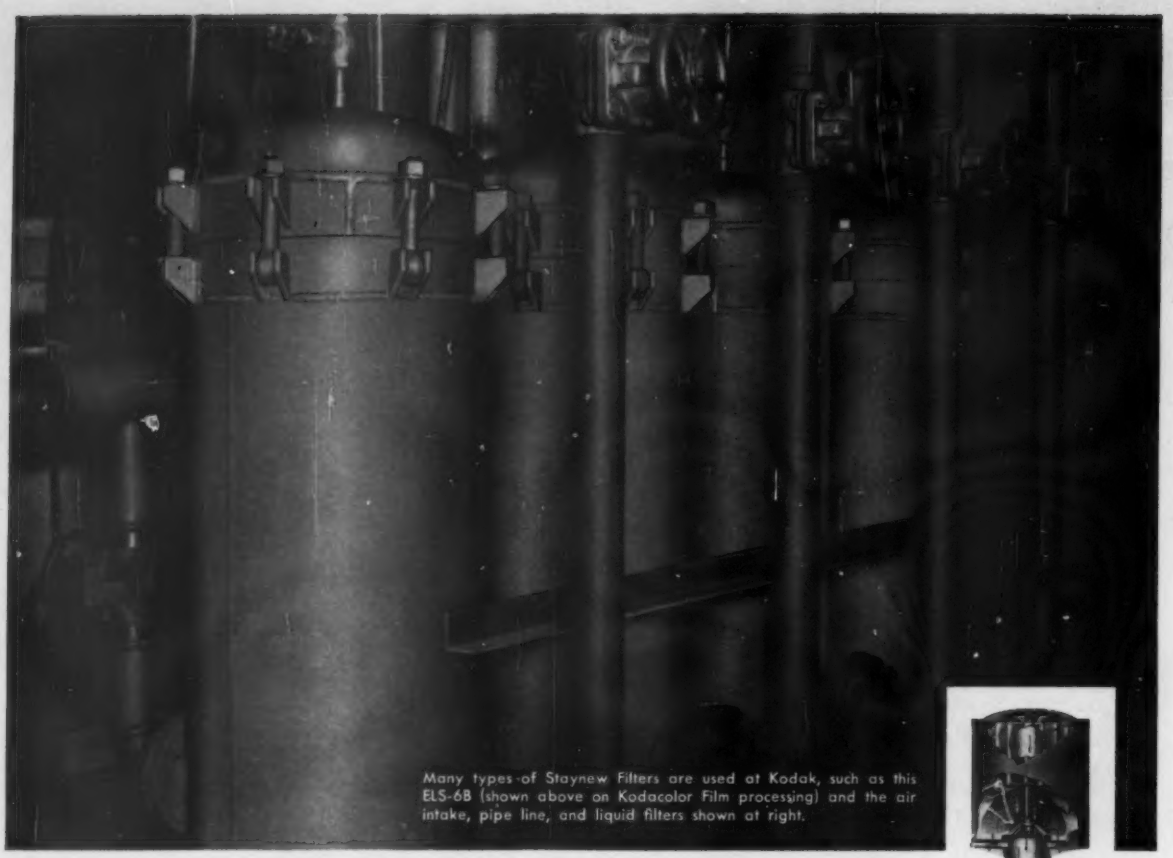
Says Mr. Ed Gagnon, plant electrician, "Our Westinghouse motors have given us complete reliability on the roughest tests we have ever seen a motor endure."

For specific information about the ways your operation can benefit from the improved performance, longer life and reduced maintenance offered by the dependable Life-Line "A," contact your nearby Westinghouse sales engineer. Or write to Westinghouse Electric Corporation, P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pennsylvania. J-22077

YOU CAN BE SURE...IF IT'S Westinghouse

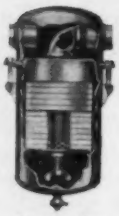
Deposits of powdered iron ore are no problem to this 2-hp Life-Line "A" motor driving conveyor which carries powdered iron ore to the balling disc where ½" pellets are formed. Presealed, prelubricated Life-Line "A" bearings keep dirt and other material out.

For more facts circle 551 on Reply Card

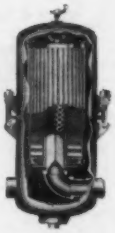


Many types of Staynew Filters are used at Kodak, such as this ELS-6B (shown above on Kodacolor Film processing) and the air intake, pipe line, and liquid filters shown at right.

Air Intake Filter (Bulletin 100)



Pipe Line Filter (Bulletin 200)



Liquid Filter (Bulletin 300)

Staynew Filters Help Maintain Quality through cleanliness at Kodak

In film making, cleanliness is one of the important factors affecting quality. That's why, at Eastman Kodak in Rochester, production areas are scrubbed frequently, white sanitary uniforms are worn, and Staynew Filters are used to cleanse compressed air and water piped to vital machines and processes.

At the Kodak Park Works, films, papers, and chemicals are made. Here, on film-casting machines, personnel wear masks at certain times to protect themselves from toxic fumes; Staynew Filters keep out oil, dirt, and water from the compressed air that goes to the masks. Staynew Filters supply clean air to pneumatic instruments, controls, and cylinders used in film casting and other operations. And, Staynew Liquid Filters protect both equipment and film in the critical processing of Kodacolor Film.

At Kodak's A. & O. Division (Hawk-Eye Plant), which makes lenses and other precision optical equipment, Dollinger filters clean the air used on pneumatically-driven drills, cylinders, hoists, and blow guns. Dollinger's responsibility is an important one—dust lodged in an expensive lens assembly, for example, can cause the assembly to be rejected.

Kodak uses Staynew Filters for several good, sound reasons. Staynew's Radial Fin Construction provides the greatest active filtering area possible for available space—it maintains low velocity and unusually low resistance to flow. Filter elements, available in any material, are simple and inexpensive to replace. For cleaning and inspection, complete access to the interior is possible by merely removing wing bolts.

Dollinger has a filter for every need, whether it's film processing or a hundred and one other jobs. Proper filtration depends on many factors —material, temperature, pressure. Your best bet is to consult a Dollinger representative—he'll be glad to work with you on application problems. Or, send for the Bulletins described. Dollinger Corporation, 55 Centre Park, Rochester 3, N. Y.

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STAYNEW FILTERS

DOLLINGER

SPECIALIZING IN DRY TYPE FILTERS FOR OVER 35 YEARS

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

For more facts circle 552 on Reply Card

For more facts circle 553 on Reply Card

You *know* this plastic daylighting panel retards fire

With this panel, you're sure.

The labels tell you it is safer . . . has passed the down-to-earth, industry-accepted tests that let you specify it with confidence.

It won't support combustion—can't contribute to spread of a blaze. That's why it is *right* for a school . . . a factory . . . a hospital—any place where code requirements are stiff and safety is a must.

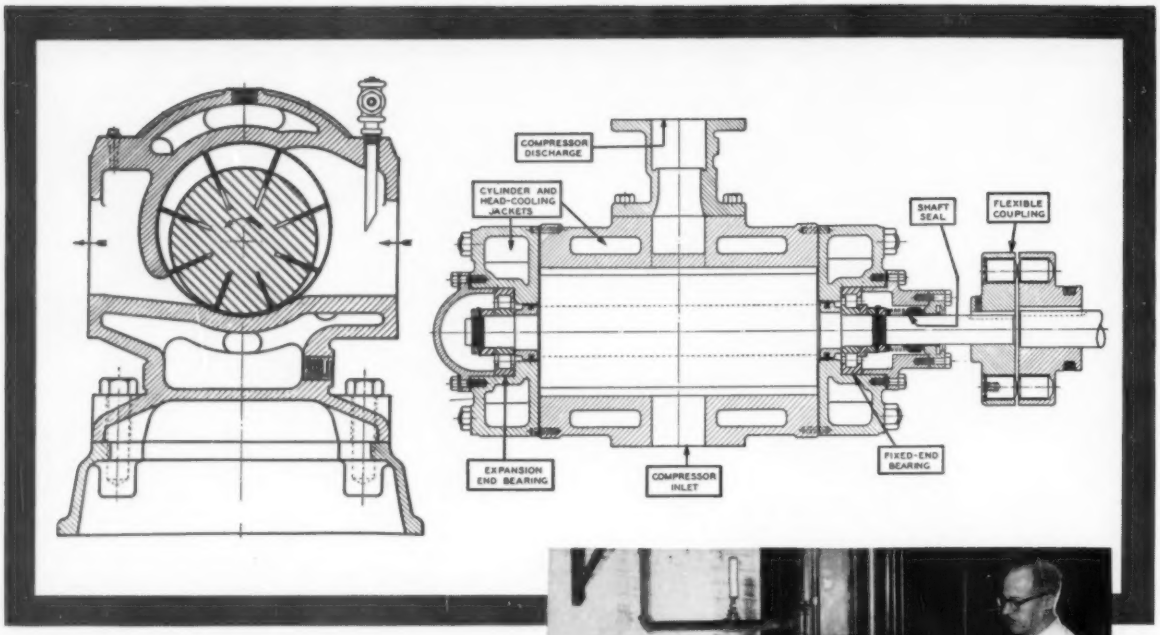
It's safer because it is made with Hetron®, the inherently flame-retardant polyester plastic which we make. You can get colorful, non-shattering Hetron panels and flat panes from any leading fabricator of polyester glazing material. For safety's sake, be sure to specify "Hetron" or "fire-retardant grade." It costs a little more . . . and is worth it. For names of fabricators who can supply you, write us.

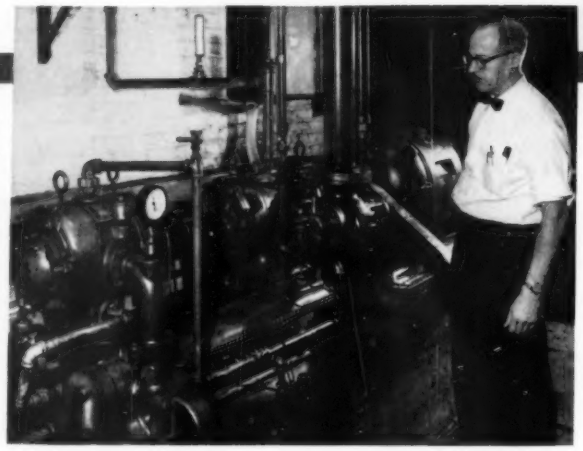
DUREZ HOOKER CHEMICALS PLASTICS

PLASTICS DIVISION

HOOKER CHEMICAL CORPORATION

3901 Walck Road, North Tonawanda, N. Y.





Hard service never affected this Fuller rotary's original output—230 cfm. of air at 90 lb. G., reports Mr. Schott, chief engineer, Thomas C. Wilson, Inc., Long Island City, N.Y.

FULLER ROTARY COMPRESSOR RUNS 13 YEARS WITHOUT DOWNTIME

A Fuller rotary at Thomas C. Wilson, Inc. got its first maintenance shutdown recently, for renewal of roller bearings and rotor vanes—after running without downtime since 1945.

4 years of 24-hour service. The Wilson plant makes tube cleaning equipment, tube expanders and portable pneumatic tools, and so makes heavy daily demands on shop air. For the first four years, three-shift operation kept the Fuller rotary running round the clock. Since 1949, it's been working eight-hour shifts.

Simple design means trouble-free service. Besides bearings, the only moving parts in a Fuller vane-type rotary compressor are the cylinderical rotor and the blades. These compensate for wear automatically. Cylinder head slips off, permitting blade and bearing inspection in a matter of minutes.

Compact and vibration-free. Direct-drive system saves space. Simple, rugged design gives constant service without extensive supervision. Thus, Fuller rotaries can be installed out-of-the-way—on upper floor, on balconies, in basement corners, using low-cost, light-weight foundations.

1189
C-340

Visit Booth 513
Plant Maintenance and Engineering Show
January 26-29, Cleveland, Ohio

Write today for detailed information on the full line of Fuller rotary compressors for in-plant services, gas gathering, and industrial refrigeration.

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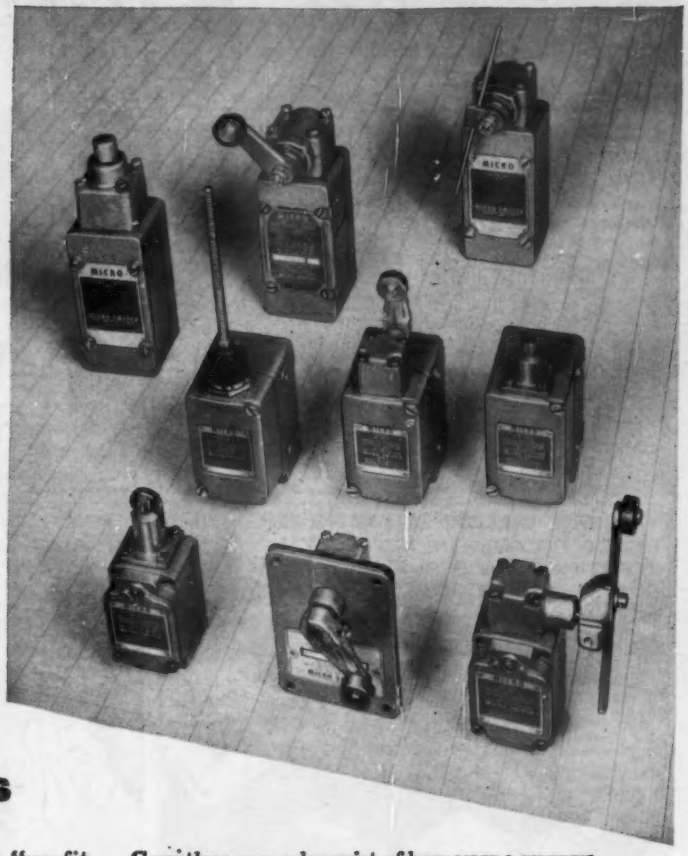
....pioneers in harnessing AIR

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

For more facts circle 554 on Reply Card

MICRO SWITCH Precision Switches



Here's how you can automate your plant at low cost and get high immediate savings

Thousands of plants have cut the "profit squeeze" by making their existing production equipment more automatic with compact, reliable, long-life MICRO SWITCH precision switches.

This procedure requires little investment. The savings are very worthwhile. The pay-off is immediate.

One manufacturer reports a production increase of 250% from two machines. Another reports savings of four times the amount of his investment, which was less than $1,000. Still another is now automating his third plant.

In short, simple MICRO SWITCH automation shows a big return in a short time on a minor investment.

Countless examples exist of how MICRO SWITCH automation can be applied with practically no disruption of production and with drastic reductions in costs, improved product quality, and less spoilage.

MICRO SWITCH Precision Switches for industrial use are available promptly from the authorized distributor near you. Send for Catalog 101.

—•—

MICRO SWITCH . . . FREEPORT, ILL.
A division of Honeywell
In Canada: Honeywell Controls, Ltd., Toronto 17, Ontario

—•—

Look in the Yellow Pages for location of Branch Office or name of Authorized Distributor

Honeywell
MICRO SWITCH PRECISION SWITCHES

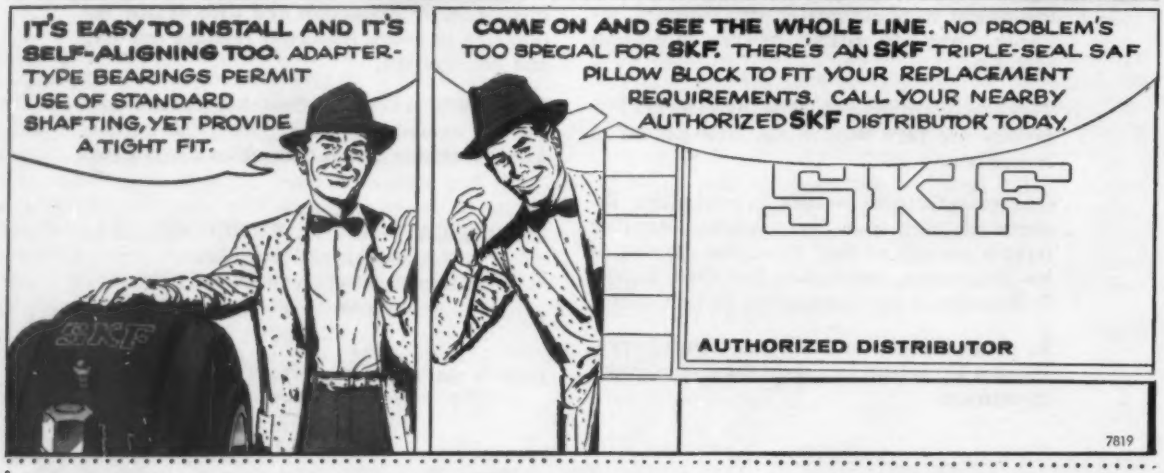
For more facts circle 555 on Reply Card

The real life adventures of DISTRIBUTOR DAN

the SKF bearing man

LOOK OUT! AN ACCIDENT LIKE THAT CAN LAND YOU IN THE HOSPITAL FOR DAYS! THAT CUTS YOUR PAY, CUTS PRODUCTION, CUTS PROFITS. WHAT HAPPENED, ANYWAY?
HERE'S THE CULPRIT.. LEAKING LUBRICANT! OIL IS LEAKING OUT OF THIS PILLOW BLOCK. WHEN IT HITS THE FLOOR- YOU'VE GOT A BAD ACCIDENT HAZARD.

THIS SKF PILLOW BLOCK NEVER LEAKS BECAUSE ITS TRIPLE-SEAL ROTATING RING SEALS IN OIL AND GREASE FOR GOOD!
DIRT! THIS COULD MEAN WEAR...OR WORSE! IT'S A GOOD THING THEY'RE INSTALLING THAT SKF TRIPLE-SEAL PILLOW BLOCK. IT SEALS OUT ALL FOREIGN MATTER, EVEN IN VERY DUSTY LOCATIONS.


IT'S EASY TO INSTALL AND IT'S SELF-ALIGNING TOO. ADAPTER-TYPE BEARINGS PERMIT USE OF STANDARD SHAFTING, YET PROVIDE A TIGHT FIT.
COME ON AND SEE THE WHOLE LINE. NO PROBLEM'S TOO SPECIAL FOR SKF. THERE'S AN SKF TRIPLE-SEAL SAF PILLOW BLOCK TO FIT YOUR REPLACEMENT REQUIREMENTS. CALL YOUR NEARBY AUTHORIZED SKF DISTRIBUTOR TODAY.
SKF
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7819

Spherical, Cylindrical, Ball, and Timken® Tapered Roller Bearings

EVERY TYPE—EVERY USE

SKF

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

*REG. U. S. PAT. OFF.

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NEW MACK TRUCK PLANT INSURES TOP POWER FLEXIBILITY, LOWER COSTS...

MACK TRUCKS, INC., SIDNEY, OHIO

Engineers:
Schweiger & Heapy
Dayton, Ohio

Electrical Contractor:
Sidney Electric Company
Sidney, Ohio

Ⓐ Aluminum PowerPlugin duct everywhere in this new building guarantees full power efficiency.

Aluminum PowerPlugin Busduct installs easily, quickly, inexpensively.

FRANK ADAM *Aluminum* BUSDUCT

Mack Truck now has the ultimate in power efficiency!

By installing new Ⓐ Aluminum PowerPlugin Busduct Mack Truck enjoyed the advantages of lower initial cost *plus* substantial savings in installation time because of lighter weight and easier handling. New circuits can be plugged in fast for new machines or for relocating old without production loss—plant layout can be quickly changed; the whole power distribution system can be increased or altered virtually overnight. Eliminated are temporary connections and long lead-ins that cause voltage drop and production slow-ups.

Specify Ⓐ Aluminum Busduct on your next project.

FRANK ADAM

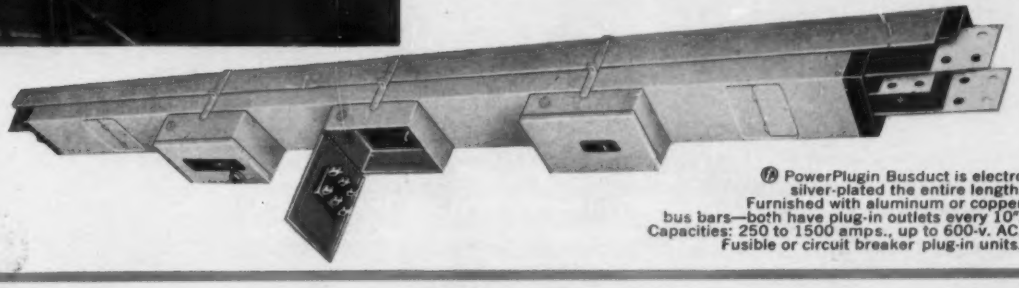
Write for catalog data

Ⓐ Products are the sign of a better job

FRANK ADAM ELECTRIC CO.

P. O. BOX 357, MAIN P. O. • ST. LOUIS 66, MO.

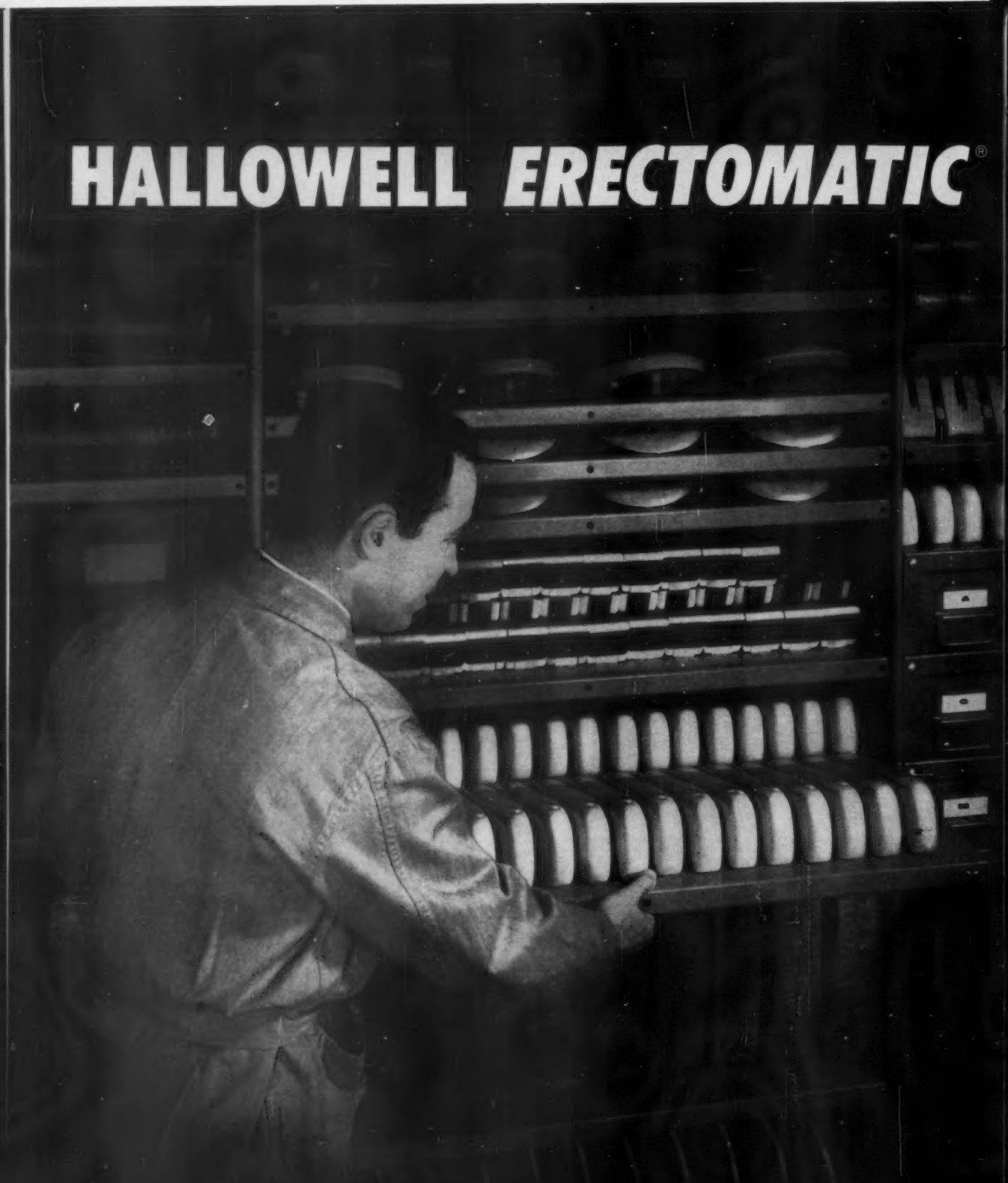
busduct • panelboards • switchboards • load centers
service equipment • safety switches • Quikheter



Ⓐ PowerPlugin Busduct is electro silver-plated the entire length. Furnished with aluminum or copper bus bars—both have plug-in outlets every 10". Capacities: 250 to 1500 amps., up to 600-v. AC. Fusible or circuit breaker plug-in units.

For more facts circle 557 on Reply Card

HALLOWELL *ERECTOMATIC*®



Individually adjustable shelves allow as much as a 20% saving in floor space, with ERECTOMATIC shelving. To raise or lower, shelves pull straight out without tilting—and without disturbing contents. In addition, every ERECTOMATIC shelf has more usable space than shelves of conventional units.

SHELVING...

stores more in less space

...for a leading Automotive Manufacturer—storage area cut 25% in a new plant

...for a West Coast Drug Wholesaler—$28,000 saved in space and labor

...for a Tool and Die Maker—full cost of ERECTOMATIC SHELVING saved in one year

ERECTOMATIC SHELVING is *designed* to save your storage dollars three ways:

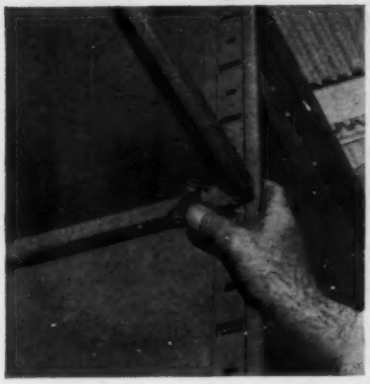
Quick Installation—ERECTOMATIC goes up fast . . . costs less to assemble.

Adjustability—ERECTOMATIC shelves are individually adjustable to meet size and weight of changing loads. Waste air space is eliminated. Easy straight-in, straight-out shelf changing makes ERECTOMATIC the most adaptable storage system you can find.

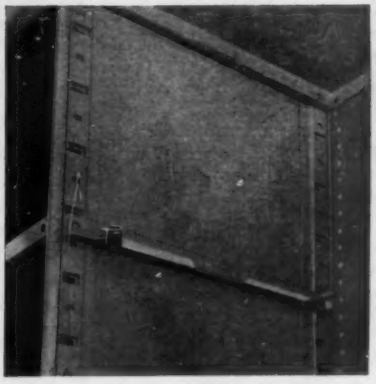
Annual Costs—Since an ERECTOMATIC installation holds material more efficiently, you need less floor space for storage, with resulting annual savings.

Your Columbia-Hallowell dealer can give you complete details, or write for fully illustrated literature to Columbia-Hallowell Division, SPS, Jenkintown 26, Pennsylvania, or SPS Western, Santa Ana, California.

Some of the exclusive *ERECTOMATIC*® features:



FAST ASSEMBLY. Just position the shelf supports, insert the shelf, and press the unique locking device. No tools are needed at any time.



FULL-DEPTH SHELF SUPPORT. The load is distributed over the full depth of the shelf, rather than supported only at front and rear.

FULL USE OF SHELF AREA. Beaded front posts make full width of shelf usable . . . won't snag clothes, hands or stored goods.

SEE *ERECTOMATIC*® and the Hallowell line of SHOP EQUIPMENT at the Plant Maintenance Show, Jan. 26-29. Booth 1104.

SPS Jenkintown • Pennsylvania

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co. • National Machine Products Co. • Nutt-Shel Co. • SPS Western • Standco Canada Ltd. • Unbrako Socket Screw Co., Ltd.

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In new plants large and small...

The C-E high temperature water boiler offers savings of 10 to 20%

Shop-assembly view showing steel frame and pressure parts for 25-million Btu unit prior to installation of refractory, insulation block, and welded gastight casing.

Compactness of C-E HCC Boilers is demonstrated in this view of two 10-million Btu units installed at a new Michigan high school.

Representative list of C-E HCC Boilers in service, under construction, or on order

	No. of Units	Normal Output ea.— Btu/Hr. (millions)	How Fired
A. E. Smith High School Riverview, Michigan	2	10	Oil
J. Bishop & Co. Malvern, Pa.	1	12	Oil
Colorado State College Greeley, Colo.	1	60	Oil—Nat. Gas
Crors Company, The Frazer, Michigan	2	12	Nat. Gas—Oil—
Defense Construction Ltd. Camp Gagetown, N. B., Canada	3	70	Pulv. Coal Gas
Erie Mining Company Aurora, Minn.	2	65	Stokers—Oil or Gas
Convair Astronautics Div. General Dynamics Corp. San Diego, Calif.	2	30	Oil—Nat. Gas
General Motors Overseas Santos, Brazil	1	12	Oil
Hillcrest Medical Center Tulsa, Oklahoma	1	30	Nat. Gas
Marquardt Aircraft Co. Ogden, Utah	2	12	Oil—Nat. Gas
Michigan State University Oakland, Michigan	1	12	Oil—Nat. Gas
New Florida State Prison Raiford, Florida	2	30	Oil—Nat. Gas
North Carolina Wesleyan College Rocky Mount, N. C.	2	18	Oil—Nat. Gas
U. S. Air Force Academy Colorado Springs, Colorado	3 2	100 30	Oil—Nat. Gas
U. S. AIR FORCE: Clinton County Air Force Base Wilmington, Ohio	1	16	Stoker
Dover Air Force Base Dover, Delaware	3	50	Oil—(Fut. Coal)
Forbes Air Force Base Topeka, Kansas	3	72	Oil—Nat. Gas (Fut. Coal)
Grand Forks Air Force Base Grand Forks, North Dakota	2	25	Stokers—Oil
McGuire Air Force Base Wrightstown, N. J.	4	50	Stokers
Minot Air Force Base Minot, North Dakota	2	25	Stokers—Oil
Plattsburgh Air Force Base Plattsburgh, N. Y.	2	50	Oil
Portsmouth Air Force Base Portsmouth, N. H.	2	110	Oil—Nat. Gas (Fut. Coal)
Wright-Patterson Air Force Base, Dayton, Ohio	1	30	Stoker
Wuthsmith Air Force Base Oscoda, Michigan	2	25	Stokers
Air Force Base Torejon, Spain	3	43	Oil
U. S. Navy Auxiliary Air Station Fallon, Nevada	2	15	Oil

The list at right points up the versatility and widespread acceptance of Combustion Engineering's HCC boiler. For industrials, schools, institutional use, military bases – wherever there is extensive space to be heated – C-E high temperature water has a place.

Featuring the same principle applied by Combustion in many of its large utility boilers, the C-E LaMont Controlled Circulation Hot Water Boiler offers a compact and effective arrangement of heating surfaces. This design gives precision temperature control, and, dependent upon local conditions, the HCC can save 10 to 20 per cent in maintenance and operating costs – a significant factor when considering a heat source.

Available in a wide capacity range – from 10 to 300-million Btu's – these boilers operate at water pressures up to 500 psi and temperatures to 470 F or higher. The smaller capacity HCC's are completely shop-assembled, while the intermediate and large units are shipped in varying stages of assembly. This C-E practice greatly reduces erection costs.

If you are in the market for boilers, either for space heating or process requirements, it may prove greatly to your advantage to investigate C-E high temperature water as your heat source.

Because individual needs vary, *both* steam and hot water have their applications. Combustion Engineering can furnish either, and our engineers are exceptionally qualified to discuss *impartially* with you or your consultants the method most suitable for your situation.

Write for further details on Combustion Engineering's High Temperature Water Boilers.

COMBUSTION ENGINEERING

C-E

C-190A

Combustion Engineering Building, 200 Madison Avenue, New York 16, N. Y.

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

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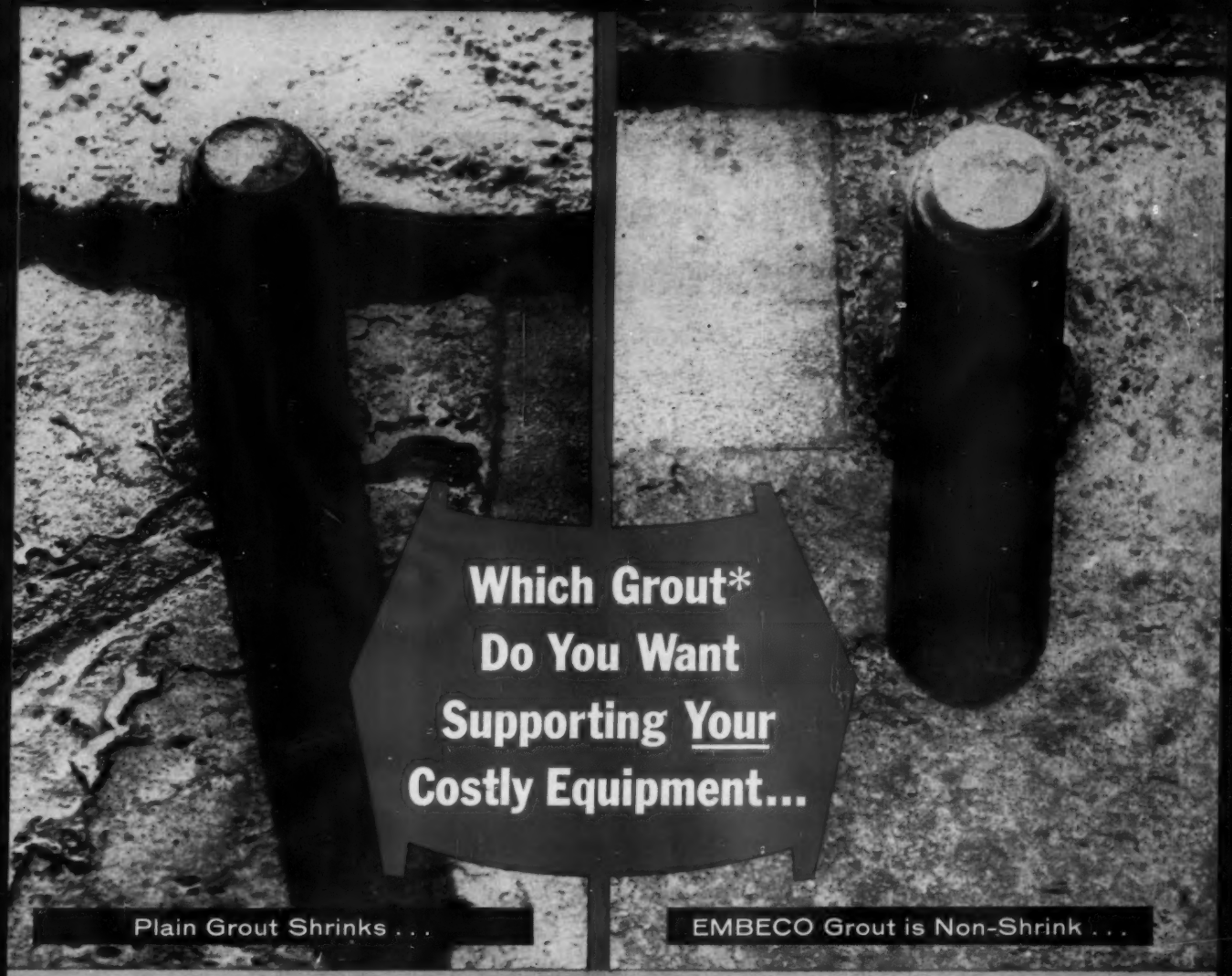
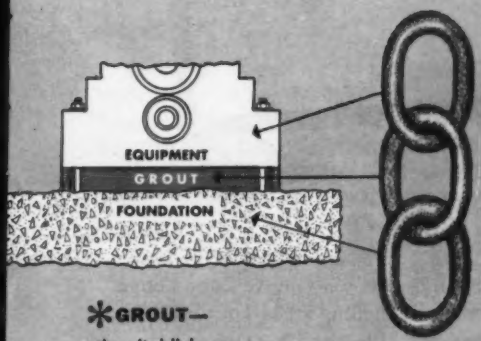


. . . to withstand: IMPACT • POUNDING ACTION • VIBRATION • SIDE THRUST • TORQUE



***GROUT**—
the vital link
between equipment
and foundation

LEFT PHOTO... *Plain Grout* shrinks and leaves only a web of mortar and a small shim area to support bedplate . . . results in a *short-life* grout which causes costly shutdowns, possible equipment damage, and loss of production.

RIGHT PHOTO—*Embeco Non-Shrink Grout*. . . provides full bedplate support, maintains alignment and has high impact resistance . . . is a long-life grout that avoids trouble and cost of untimely re-grouting.

Full information on Embeco Pre-Mixed Grout and "Grouting Specifications"—a valuable guide on machinery and equipment grouting—on request.

THE MASTER BUILDERS CO.

Division of American-Marietta Company

Cleveland 3, Ohio—Toronto 9, Ontario
Cable Address, Mastmethod, N. Y.

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"97% of our General Electric Power Groove Lamps are still going strong after 6500 hours!"

SAYS ERICKSON TOOL COMPANY, SOLON, OHIO

ERICKSON TOOL COMPANY
34350 SOLON ROAD
SOLON, OHIO

December 22, 1958

Mr. Q. D. Dobras
Application Engineering
General Electric Lamp Division
Nela Park, Cleveland 12, Ohio

Dear Mr. Dobras:

Thanks for your continued interest in our Power Groove lighting system. You have more and more reason to be proud of it.

You told us these lamps had a useful life expectancy of 5,000 hours. Now, after 15 months, or a full 6,500 hours of use, only 3% have burned out! In my opinion this is an excellent record of performance.

As you can tell, we're still mighty pleased we selected Power Grooves for our lighting. They've helped us maintain our high-quality production standards (the men think they're great), and they're practically maintenance-free.

Sincerely,

S. S. Benjamin, Vice President
Erickson Tool Company

SSB/dmw

G-E POWER GROOVES give nearly twice as much light as high output fluorescents—2½ times as much as slimlines. You can get more light per fixture, with fewer parts to maintain, and save 5% to 20% on original investment.

FREE! NEW 24-PAGE BOOK entitled "21 Industrial Lighting Problems Solved With Power Grooves". This illustrated book gives you the whole story on G-E Power Groove Lamp design—plus specific details on how to get the highest, most economical lighting levels. For your copy, write: General Electric Co., Large Lamp Dept. C-901, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

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COURT DECISIONS —a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Right to Work

SUIT WAS BROUGHT by a labor union in Nebraska against a manufacturer for the specific performance of a collective bargaining agreement. In the agreement the employer agreed to discharge any employee of the union who ceased to remain a member in good standing.

In the constitution of that state, it is provided, "No person shall be denied employment because of membership in or affiliation with or resignation or expulsion from a labor organization or because of refusal to join or affiliate with a labor organization; nor shall any individual or corporation or association of any kind enter into any contract, written or oral, to exclude persons from employment because of membership in or nonmembership in a labor organization."

Holding the provision in that collective bargaining agreement illegal and void, the Nebraska court said, "The amendment prohibits no one from joining a union but undertakes to lawfully assert that neither membership or nonmembership in a union shall be a condition precedent to the right to work. It is inclusive of all employers and employees in the state. It does not deny the union member the equal protection of the law but gives the nonunion employee a protection of the law which he had not theretofore enjoyed." Court brief 31 N.W.2d 477, Nebraska.

Engineering Plans

SUIT WAS BROUGHT by the Administrator of the U. S. Wage and Hour Division against an engineering firm for failure of that firm to pay its employees the prescribed time and a half for overtime for work exceeding 40 hours a week.

In the performance of its work, this firm prepared drawings and specifications to supplement recommendations made to clients. It did not, however, buy or sell merchandise of any sort. Their work was solely the rendering of services in connection with many kinds of equipment.

Here, the federal court refused to hold this employer obligated under this provision of the federal statute. "With respect to required compensation of employees for work in excess of 40 hours a week, it will of course be remembered that the Act covers only those employees who are themselves engaged in interstate commerce or in the production of goods for commerce.

"It is not contended in this case that any of these employees are engaged in interstate commerce but it is contended that the mere preparation of plans intended to be sent by mail, express or messenger to a client, in another state, constitutes production of goods for commerce.

"Certainly the word 'goods' could not be considered to include professional advice and its definition should not be construed to include the typewritten or mechanical expression by which advice is given. They are specifically prepared to meet the particular problem of a specific client and are not sold or offered for sale to the public generally." Court brief 81 F.S. 86, Md.

Lien of Manufacturer

CONTRACT TO manufacture tape recorder-reproducer units for one year was made by a metal products company with a magnetic tape recorder producer. Under this agreement the manufacturer agreed to produce the jigs, dies and tools necessary for the manufacture of these units.

On its side the purchaser undertook to reimburse the manufacturer up to $47,000 for this tooling expense and advance 51 per cent of that sum. In addition, a further advance would be made for the purchase of raw material and parts to be used in the manufacture of these units. Also, title to all tooling materials and parts and to all units was to be in the name of the purchaser of these tape recorders. Further, the purchaser had in its sole discretion the right at any time to cancel in whole or in part any portion of any order or orders.

Four months after the making of this agreement, the purchaser notified the manufacturer that the contract was cancelled and demanded possession of all the production and testing equipment, finished units and raw materials. This demand was not met and the materials were seized in an action for their possession. In its defense, the manufacturer claimed a lien for the work already performed.

The right of the manufacturer to this lien was upheld by the court. "There is no doubt," it was said in that decision, "that the manufacturer who at the request of the owner, does work or adds materials to a chattel, is entitled to a possessory lien for the value of the work performed.

"In this case the manufacturer claims liens on the tools, dies, jigs and the raw material. The agreement is silent with respect to whether it has a lien and does not provide specifically that the property is not to be subjected to any lien. However this does not mean that the manufacturer waived its rights to a common law lien on articles such as the tools, dies and jigs and inventory for there was no agreement with respect to the delivery of those items without payment." Court brief 88 Atl. 2d 40, Pennsylvania.

Life Employment

SUIT WAS BROUGHT by a former employee against a New Jersey manufacturer. The employee contended that the company had broken a lifetime employment contract it had made with him and that contrary to the terms of that agreement he had been discharged after 33 years of service.

After 12 years of employment the vice-president and secretary of the company had said to this employee, "You will have a foreman's job the rest of your life." Some years later the same man had renewed this assurance with the assertion, "I told you not to worry. You will have your foreman's job there as long as you live."

Eleven years later the employee

COURT DECISIONS

received notice from the company that this job had ended. With the notice was a check for $3000 and the memorandum, "Payment being made to you in connection with the termination of your employment by this company."

In its decision of the suit brought by this employee for breach of his contract, the court held there was no enforceable agreement for life employment. "An offer must be so definite in its terms," it was said by the court, "or require such definite terms in the acceptance that the promises and performances to be rendered by each party are reasonably certain.

"Here, no salary was agreed upon nor was provision made as to what would occur if this employee became wholly or partially unable to perform his duties or fulfill the terms of his contract. No mention was made of the effect disability would have. Many other possible future contingencies were not covered by or provided for in the agreement made." Court brief 89 Atl. 2d 237, New Jersey.

Damages for Delay

ORDER FOR 92,300 sets of molded tool parts was given a plastic molding company by a purchaser. These parts were to be employed by the purchaser in assembling tools to be used by the Army Signal Corps in connection with radar apparatus. No delivery dates were specified nor was the manufacturer advised of the purpose of these parts.

After receiving the delivery of 14,058 sets, the purchaser refused further shipments. In the suit brought by the manufacturer for items delivered and damages for this breach of the contract, the purchaser set up as a counterclaim its loss of profits due to delayed deliveries resulting in the cancellation of its contracts for supplying these radar tool parts.

The Pennsylvania court refused to allow these damages. "While the manufacturer no doubt knew that the parts he was furnishing to the purchaser were to be used by the latter in the manufacture of tools for the United States Army Signal Corps, there is no evidence that any specific information was given to him at or prior to the time when his contract with the purchaser was entered into, as to the terms of the latter's contract and especially its provisions concerning the time the purchaser agreed to supply the tools.

"Damages for which compensation may be justly claimed and allowed are such only as naturally and ordinarily flow from the breach of contract complained of. They should be such as may fairly be supposed to have entered into the contemplation of the parties when they made the contract or such as might according to the ordinary course of things, be expected to follow its violation." Court brief 50 Atl. 2d 314, Pennsylvania.

Employment Contract Restrictions

CONTRACT MADE by an engineering firm with an employee provided that the employee would not, while the contract was in force or at any time within two years after its termination, enter into the employment of any client of the employer. In case of a violation of this provision the employer was entitled not only to an injunction but also to the sum of $10,000 as liquidated damages.

This former employee violated his agreement and entered the employ of a client of his former employer. The court said in its refusal to permit a recovery for damages:

"If the provision was inserted for the purpose of deterring the employee from breaching his contract and penalizing him for doing so, instead of specifying the sum which the parties in good faith agreed upon as representing damages which would ensue from a breach, it is to be regarded as imposing a penalty. The provision under consideration is within this category. In such a case recovery will be limited to the actual damages and if no damage is proven, no recovery may be had." Court brief 2 Atl. 2d 385, Connecticut.

Construction Permit

AN APPLICATION was filed by the owner of a steel fabricating, cutting and processing plant for a permit for the erection of a traveling hoist and crane to be used in the handling of these materials. When the permit was refused by the Commissioner of Public Buildings, the owner of the business sought a review of this refusal by the Board of Appeals of that city.

Following an appeal before the Superior Court of the state the order of the Commissioner was cancelled and the issuance of this permit ordered. From that decision, the Commissioner appealed to State Supreme Court which held that:

"It was the statutory duty of the Commissioner of Public Buildings to grant the owner of this business the permit for the erection of a structure which was in conformity with the ordinance. His failure so to do was also a violation of the building code of the city. The action of the board was likewise in error.

"Its duty was to 'make such order or decision as ought to be made,' and it has 'all the powers of the officer from whom the appeal is taken' and may issue or direct the issue of a permit." Court brief 111 N. E. 2d 674, Massachusetts.

Liquidated Damages

CONTRACT WITH a copper and brass manufacturer for the construction and delivery of brewery equipment contained the clause, "All of said equipment to be furnished f.o.b. cars, Chicago, for the sum of $5800, which sum the purchaser agrees to pay if satisfactory and contact and delivery made not later than January 1st.

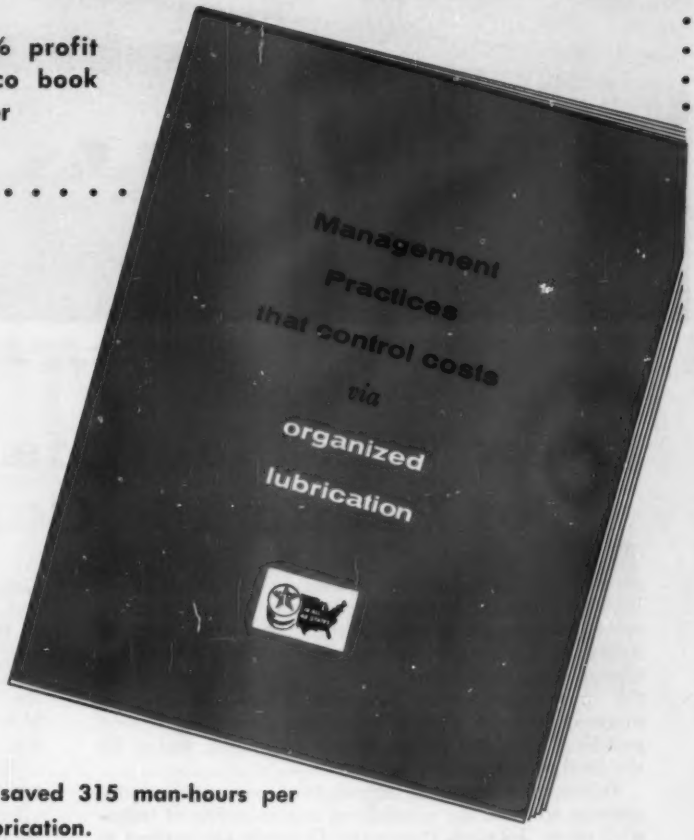
"If later, then the said purchaser is to deduct from said amount, on account of inconvenience, direct damage done to said purchaser and as liquidated damages, the sum of $25 per day for each and every day that said delivery is made f.o.b. later than said January 1st."

Delivery was delayed 60 days and the purchaser claimed a deduction of $1500 from the price stipulated in the contract. The court, allowing this amount as damages, said.

"Courts of common law cannot award such damages as they may deem reasonable but must allow the damages whether actual or estimated, as agreed upon by the parties." Court brief 70 Pac. 236, Wash.

Neglected area of cost-control-opportunity uncovered by NEW BOOK

Guide to potential 4% profit increase makes Texaco book latest business best seller



Why you need it: The Texaco guide uncovers a new area where management can effect real economies in reduced maintenance costs. This is especially important now that decentralization and generally lower profit margins make the profit-and-loss statement the real measure of each plant unit's management efficiency.

What it will tell you: With facts like these, the Texaco guide shows that organized lubrication can raise production, extend parts life, and cut downtime:

★**A metalworking manufacturer saved 315 man-hours per month through more efficient lubrication.**

★**A major corporation anticipates substantial maintenance savings through the services of a lubrication engineer.**

★**A mill has increased bearing life from 16 to 72 shifts by instituting systematic lubrication that insures the right lubricant for each machine.**

How it will help you: Only organized lubrication gives management such an opportunity for savings. For example, a 10% reduction in maintenance costs through better lubrication methods will increase profits up to 4% in the average plant—more than equivalent to a 4% increase in sales. And Texaco's new guide shows how it may be done.

How to get your copy: Simply fill in the coupon, attach it to your letterhead, and mail it to The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THE TEXAS COMPANY
Dept. E-71
135 East 42nd Street
New York 17, N. Y.

TEXACO

Please send me *Management Practices that Control Costs via Organized Lubrication.*

Name_____

Title_____

For more facts circle 562 on Reply Card

National Wax Company, Skokie, Illinois, designed and built by Ragnar Benson, Inc., Chicago. O. A. Wendt Co., mechanical contractor, Chicago.

New Wax Plant Makes Varied Use of Pneumatic Control System

At the new National Wax Company plant in Skokie, Illinois, Johnson Pneumatic Controls provide flexible, precise regulation of process steam, hot water and air conditioning as well as of the comfort air conditioning, heating and ventilating systems. The photographs on the opposite page show examples of how this specially planned Johnson System solves the diversified control problems involved in producing petroleum waxes for the food and container industries.

Johnson has installed thousands of pneumatic control systems to meet the specialized requirements of industrial users. Johnson Pneumatic Controls are applied to all types and makes of air conditioning, heating, cooling and ventilating equipment and to a wide range of processes.

Besides providing reliable, high-accuracy control, a Johnson System offers important economic advantages. For example, pneumatic controls are simpler, have fewer components, are easier to understand and operate and require less supervision and maintenance than anything else you can use. Power consumption is but a fraction of that used by other types of controls. And, Johnson equipment does not require the type of periodic maintenance-replacement program that eventually replaces the system. *You pay only once* for, given ordinary care, a Johnson System can be expected to last for the life of the building.

Next time you have a control problem, why not investigate the performance features and operational savings offered by pneumatic controls? A nearby Johnson engineer will gladly give you the facts.

JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

R-1051
Static Pressure
Indicator-Controller

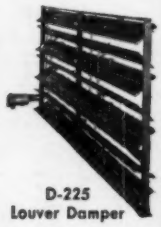
T-800 Remote
Bulb Thermostat

V-210 Three-Way
By-Pass Valve

T-400
Room Thermostat

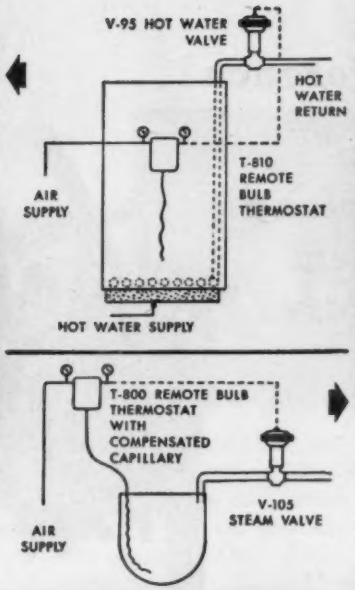
V-108
Three-Way
Mixing Valve

V-530 Precision
Pilot Positioner
applied to valve



D-225
Louver Damper

Tank Farm. Temperatures in twenty 12,000-gallon tanks for storing petroleum waxes are individually controlled by Johnson Thermostats and Valves. Wax is delivered in tank cars, heated to liquid form and piped in through heated lines.



Compounding. Ingredients are mixed in kettles containing up to 3,000 gallons. Kettle temperatures are controlled by Johnson Remote Bulb Thermostats which modulate Steam Valves to maintain a constant condensate return temperature.

Slabbing. Johnson Controls regulate the cooling system for the slabbing room where overnight 40 tons of hot wax are cooled to 40F for packaging in solid form. An economizer control arrangement cuts cooling costs by utilizing outdoor air instead of mechanically cooled air whenever possible.

Comfort Controls. The Johnson System assures an ideal working environment, includes individual room control of the office section air conditioning. Night setback feature keeps costs down. Shown at his desk is J. M. Packel, National Wax Company president, with W. J. Noll, traffic manager.

Johnson makes the most complete line of pneumatic control equipment for solving any problem of temperature, humidity and pressure control. Equipment includes thermostats, recorder-controllers, valves, dampers, damper operators, pressure regulators, humidostats, humidifiers, thermometers, switches, special controllers and related apparatus.

Complete engineering, sales and service facilities are available through 105 direct branch offices in the United States and Canada.

V-153 Sylphon Diaphragm Valve

D-251 Piston Damper Operator

T-1000 Recorder-Controller

JOHNSON SERVICE COMPANY
507-R East Michigan St., Milwaukee 1, Wisconsin

Please send me a condensed catalog of Johnson equipment.

Name & Title_____

Firm_____

Address_____

City & State_____

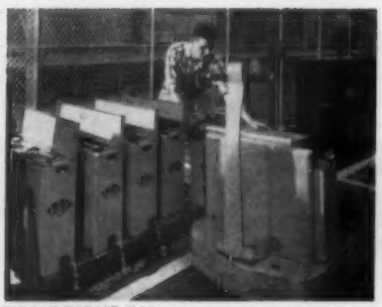
For more facts circle 563 on Reply Card

The battery that makes the difference . . .

C&D Slyver-Clad® powers smooth, clean distribution system at new Purity Stores warehouse

LOWER OPERATING EXPENSES, shown by penetrating cost-comparison studies made by Purity Stores engineers, favored electric trucks, when the fast-growing West Coast food chain planned its new 254,000-square-foot warehouse at Burlingame, Calif. Purity Stores maintains its own smoothly functioning distribution system supplying 100 stores. Handling large quantities of fresh produce and dairy items in confined storage areas, it is imperative that warehousemen avoid contaminating fumes. In an efficient two-shift *electric handling* operation, dependable power is a must. Purity Stores powers its fleet of electric trucks with C&D high-capacity *Slyver-Clad*® batteries—exclusively.

RAPID "REFUELING"—C&D batteries are designed to provide sufficient capacity for maximum life while operating on a 10-hour shift without recharging. At end of shift driver can change his own battery. Integral skids on bottom of battery facilitate battery exchange. Trucks are "refueled" without delay.



ROLLS RIGHT ON—Automatic charging equipment saves time and labor. Maintenance man merely plugs charger lead into battery. After the required amount of charge is reached, charger shuts itself off automatically. No danger of over-charging. Battery is simply rolled back onto truck. Hoists are eliminated.

EASY PREVENTIVE MAINTENANCE—Purity Stores follows proper battery maintenance procedures for long, trouble-free battery life. Exclusive C&D Five-Fold *Slyver-Clad* plate design virtually eliminates sediment. Active materials are kept working longer . . . stronger. Proof that: "C&D is your better battery buy."

For details, write for Bulletin IT-530.

C&D BATTERIES, INC.

of Conshohocken, Pa. ... Attica, Ind.

Since 1906

Sales and Service Offices in Principal Cities from Coast to Coast

Manufacturers of *Slyver-Clad* ® Industrial Batteries • PLASTICELL and PLASTICAL ® Batteries for Communications, Control and Auxiliary Power • Producers of *Autolay* * Silicon Chargers.

*Trademark

For more facts circle 664 on Reply Card

WHAT'S JUST AHEAD IN THIS ISSUE?

- ARE YOU planning to attend the Plant Maintenance and Engineering Conference? If so, you will be interested in learning what subjects will be discussed at the various sessions. We have also included a photograph of many of the chairmen and speakers so that you will be able to identify them. Turn the page for a complete rundown of the sessions.

- THOSE ATTENDING the conference will find the exhibitor guide on page 89 helpful. It may save you a few unnecessary steps in finding the booth numbers of exhibits of specific interest to you.

- WHAT DOES the plant engineer and his staff contribute to company operations? This was the question put to eight presidents and vice presidents of American industry by Associate Editor Marjorie Weissman. Their answers, starting on page 91, were remarkable for their unanimity—all acknowledged that the plant engineer was a kingpin in company operations.

- UNLESS you're designing a new plant, it isn't likely that you, as plant engineer, will be asked to design and build your own office and shop facilities. However, one plant engineer did just that, and in the article starting on page 98, he tells how he did it.

- THE SPECIAL section in this issue, beginning on page 101, deals with maintenance work control and pertinent paperwork, based on an actual system. Some of the ideas in the article can be of real value to you in running your maintenance operations. Interest has been growing in the use of maintenance controls and, properly planned and applied, they can pay dividends through better use of manpower, cost control, better upkeep of buildings and equipment.

- CAN MAINTENANCE work standards and incentives work for you? Some plants have actually adopted such an incentive system and it works. Rome Cable Corporation's system is described on page 113. The article touches on it as well as the supporting paperwork and procedures that help make bonus pay possible.

- CAN YOUR washroom maintenance costs be reduced? There are a number of areas where costs can be trimmed. One is in your janitorial service, another in the equipment and walls used in your washroom. The article on page 126 outlines specific recommendations to help you design your plant washrooms for low maintenance.

Tenth National

Plant Maintenance and Engineering Conference

Review of the papers and discussions which will be presented at the conference sessions

The Importance of Maintenance

Statement by L. C. Morrow, General Chairman, Plant Maintenance and Engineering Conference.

"The late recession gave plant management the opportunity to see the value of its increased interest in maintenance and plant engineering. It should have found that there was much less to do in the way of slack-time rebuilding and repair; that fewer services had to be brought up to date; that costs were known costs and that when business picked up the plant was ready to get under way immediately.

"Concentrate the attention of some thousands of men on maintenance for a period of ten years; give them opportunity to exchange information and experiences; expose them to the findings of the leaders in the field; and you must get results. The tenth conference continues to provide the inspiration and the meeting place for these all-important processes and, as it should be, is a step ahead of the preceding nine."

L. C. Morrow

Monday morning, January 26, 10:30 to 12:30—Music Hall

O. W. Graveley

1. Our Maintenance Management System

Chairman: L. C. Morrow, Consulting Editor, *Factory Management and Maintenance,* New York, N. Y., and General Chairman of the Plant Maintenance and Engineering Conference.

Speaker O. W. Graveley, Director of Maintenance, Electro-Metallurgical Co., Div. of Union Carbide Corp., Niagara Falls, N. Y.

Monday evening, 7:30 to 9:30 (concurrent sessions)

E. A. Wroblewski

All sessions will be held at Public Auditorium

2. Industrial Engineering in Maintenance

Chairman: E. A. Wroblewski, Industrial Engineer, International Minerals & Chemical Corp., Skokie, Illinois.

Speaker: J. U. Saum, Manager, Maintenance Management Controls Branch, Bureau of Yards and Docks, Navy Department, Washington, D. C.

J. U. Saum

Monday evening, 7:30 to 9:30 (concurrent sessions)

R. H. Morris

3. Maintenance Materials

Chairman: R. H. Morris, Editorial Director, PLANT ENGINEERING, Barrington, Illinois.

Speaker: K. N. Banthin, Supervisor of Construction and Maintenance, Food Casing Division, Clearing Plants, Visking Company, Div. Union Carbide Corp., Chicago, Ill.

K. N. Banthin

G. C. Quinn

4. Maintaining Electronic and Other Control Systems

Chairman: G. C. Quinn, Editor, Electrical Services, *Factory Management and Maintenance,* New York, N. Y.

Speakers: Charles E. Quick, Industrial Power Planning Engineer, The Detroit Edison Co., Detroit, Michigan. C. Suchanek, Superintendent of Maintenance, Republic Aviation Corp., Farmingdale, Long Island, N. Y.

C. F. Suchanek

J. Isenhower

5. Successful Case in Planning and Scheduling

Chairman: J. Isenhower, Head, Maintenance Coordination, Humble Oil & Refining Co., Baytown, Texas.

Speaker: P. Taylor, Maintenance Superintendent, The Chemstrand Corp., Decatur, Alabama.

P. Taylor

6. Economical Use of Electric Power

Chairman: W. C. Wallin, Chief, Plant Engineering Department, Western Electric Co., Inc., North Carolina Works, Winston-Salem, N. C.

Speaker: P. A. Dethloff, Building Superintendent, Continental Can. Co., Inc., Research and Development Department, Metal Division, Chicago, Illinois.

P. A. Dethloff

W. C. Wallin

7. Setting and Maintaining Sanitation Objectives

Chairman: R. A. Harvey, Plant Engineer, Valve Division, Thompson Products, Inc., Cleveland, Ohio.

Speaker: K. Bowman, Supervisor Sanitation Department, Delco-Remy Div., General Motors Corp., Anderson, Indiana.

K. Bowman

E. J. Clement

8. Why Safety Is Essential, and How To Secure It

Chairman: E. J. Clement, Executive Editor, *Mill & Factory,* New York, N. Y.

Speaker: W. C. Cooley, Assistant Department Manager, Maintenance Plant Engineering Department, Lockheed Aircraft Corp., Missile System Div., Sunnyvale, California.

W. C. Cooley

R. W. Snow

9. Preventive Maintenance

Chairman: R. W. Snow, Staff Specialist, Maintenance Planning, Industrial Engineering Div., The Procter & Gamble Co., Cincinnati, Ohio.

Speakers: L. H. Clark, Manager, Manufacturing Engineering and Facilities, Medium Transformer Department, General Electric Co., Rome, Georgia. E. C. Denny, Engineer, *Courier-Journal and Times,* Louisville, Kentucky.

Monday evening, 7:30 to 9:30 (concurrent sessions)

L. H. Clark

10. Arc Welding in Maintenance

Chairman: J. H. Poore, Maintenance Superintendent, Ashland Oil and Refining Co., Ashland, Kentucky.

Speaker: R. Wilson, Director of Application Engineering, The Lincoln Electric Co., Cleveland, Ohio.

E. C. Denny

J. H. Poore

11. Maintaining Utilities

Chairman: E. C. Hartley, Plant Engineer, Parker-Hannifin Corp., Cleveland, Ohio.

Speaker: A. F. DeLong, Plant Engineer, Electric Storage Battery Co., Exide Industrial Div., Philadelphia, Pa.

R. Wilson

E. C. Hartley

A. F. De Long

Tuesday morning, January 27, 9:30 to 12:00 (concurrent sessions)

12. Basic Procedures in Building Maintenance

Chairman: F. R. Malmgren, Manager of Buildings and Maintenance, A. B. Dick Co., Chicago, Illinois.

Speaker: G. A. McFadden, Building Engineer, Nationwide Insurance, Inc., Columbus, Ohio.

13. Training

Chairman: H. T. Lentz, Training Coordinator, Allegheny Ludlum Steel Corp., Brackenridge, Pa.

Speaker: R. W. Davis, Manager, Personnel Relations, Pittsburgh Coke & Chemical Co., Pittsburgh, Pa.

H. T. Lentz

14. Designing and Administering a Preventive Program for the Maintenance of Control Instruments

Chairman: M. S. MacGillivray, Engineering Services Manager, Canadian Industries, Ltd., Montreal, Quebec.

Speaker: J. J. Kelly, Maintenance Superintendent, Panellit Service Corp., Skokie, Illinois.

G. A. McFadden

C. W. Ufford

15. Labor Relations in Union Shops

Chairman: C. W. Ufford, Director of Industrial Relations, The Warner & Swasey Co., Cleveland, Ohio.

Panel members: C. C. Carmine, Superintendent of Maintenance and Construction, Tidewater Oil Co., Associated, California. W. E. Fore, Plant Engineer, North American Aviation, Inc., Los Angeles, California. George J. Martin, Director of Contract Engineering, Baltimore Contractors, Inc., Baltimore, Md.

R. W. Davis

Tuesday morning 9:30 to 12:00 (concurrent sessions)

H. R. Hughes

16. Counteracting Air and Water Pollution

Chairman: H. R. Hughes, Manager, Plant Engineering Services, Colgate-Palmolive Co., New York, N. Y.

Air Pollution Speaker: O. C. Thompson, Coordinator, Waste Abatements, Union Carbide Chemicals Co., Div. of Union Carbide Corp., South Charleston, West Virginia.

Water Pollution Speaker: G. A. Pettit, Industrial Waste Engineer, Armco Steel Corp., Middletown, Ohio.

O. C. Thompson

G. A. Pettit

Round Table Discussions

E. F. Wertzler

17. Maintenance in Metal-Working, Fabricating Plants

Discussion leader: E. F. Wertzler, Manager, Plant Engineering, Standard Transmission Plant, Ford Motor Co., Dearborn, Michigan.

Assistants: M. E. Bartling, Preventive Maintenance Supervisor, Standard Transmission Plant, Ford Motor Co., Dearborn, Michigan. D. A. Kerry, Plant Engineer, Transmission and Chassis Div., Ford Motor Co., Livonia, Mich.

R. D. Humphreys

G. W. Lees, Jr.

18. Maintenance of Research and Development Labs

Discussion leader: G. W. Lees, Jr., Plant Engineer, Bell Telephone Laboratories, Inc., Murray Hill, N. J.

Assistants: J. D. Henze, Plant Engineer, The Mennen Co., Morristown, N. J. P. Norelli, Superintendent of Facilities, Westinghouse Electric Corp., Research Laboratory, Pittsburgh, Pa. F. J. Ward, Assistant Superintendent, Esso Research and Engineering Co., Linden, N. J.

D. Hagen

19. Maintenance in Petroleum Processing Plants

Discussion leader: R. D. Humphreys, Maintenance Superintendent, Canadian Oil Companies, Ltd., Sarnia Refinery, Corunna, Ontario, Canada.

20. Maintenance in Nuclear Plants

Discussion leader: D. Hagen, Industrial Engineer, Chemical Processing Department, Hanford Atomic Products Operation, General Electric Co., Richland, Wash.

J. H. Fuller

21. Maintenance in Abrasive Products Plants

Discussion leader: W. Fogelberg, Plant Manager, Ideal Cement Company, Baton Rouge, La.

Tuesday afternoon, 3:00 to 5:00 (concurrent sessions)

22. Lubrication

Chairman: J. H. Miller, Chief Engineer, The Carpenter Steel Co., Reading, Pa.

Speaker: J. H. Fuller, Consultant Supervisor, Engineering Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

P. M. Kimmell

Tuesday afternoon 3:00 to 5:00 (concurrent sessions)

N. M. Brown

23. Maintenance by Outside Contractors

Chairman: M. Dyer, Assistant to the President, Trundle Consultants, Inc., Cleveland, Ohio.

Speakers: N. M. Brown, Plant Engineer, Pennsalt Chemicals Corp., Wyandotte, Michigan. P. M. Kimmell, Plant Engineering Supervisor, Eastman Kodak Co., Apparatus and Optical Div., Hawk-Eye Works, Rochester, N. Y.

R. P. Crane

24. Maintenance in Small Plants

Chairman: R. P. Crane, Plant Engineer, The Duraloy Co., Scottdale, Pa.

Speakers: N. R. Crisler, Maintenance Superintendent, Diamond Alkali Co., Muscle Shoals Plant, Sheffield, Alabama. M. M. Smucker, Superintendent of Maintenance and Development, Thompson Industries, Inc., North Vernon, Ind.

S. A. Musser

25. Maintenance in Medium-Size Plants

Chairman: S. A. Musser, Chief, Technical Area Div., The Zia Co., Los Alamos, N. Mex.

Speaker: J. M. Conrow, Works Engineer, Thiokol Chemical Corp., Longhorn Ordnance Works, Marshall, Texas.

26. Maintenance in Large Plants

Chairman: C. G. Kiplinger, Consulting Engineer, Kiplinger Washington Editors, Washington, D. C.

Speaker: R. F. Bobbitt, Maintenance Superintendent, Union Carbide Chemicals Co., Div., of Union Carbide Corp., Texas City, Texas.

Round Table Discussions

C. G. Kiplinger

27. Maintenance in Chemical Plants

Discussion leader: R. N. Price, Superintendent of Maintenance, Columbia-Southern Chemical Corp., Subsidiary of Pittsburgh Plate Glass Co., Corpus Christi, Texas.

28. Maintenance in Foundries

Discussion leader: P. A. Repino, Plant Engineer, Lebanon Steel Foundry, Lebanon, Pa.

R. N. Price

29. Maintenance in Assembly Plants

Discussion leader: J. W. Green, Plant Facilities Engineer, Plant Engineering Div., Leeds & Northrup Co., North Wales, Pa.

30. Maintenance in Electrical Manufacturing Plants

Discussion leader: C. J. Zetler, Jr., Plant Engineer, East Pittsburgh Div., Westinghouse Electric Corp., East Pittsburgh, Pa.

C. J. Zetler, Jr.

31. Maintenance in Pulp and Paper Mills

Discussion leader: L. M. Raymond, Planning Engineer, Mechanical Dept. S. D. Warren Co., Westbrook, Maine.

Wednesday morning, January 28, 9:30 to 12:00. Repeat of concurrent sessions 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11.

Wednesday evening, 7:30 to 9:30. Repeat of concurrent sessions 12, 13, 14, 15, 16, 22, 23, 24, 25, and 26.

N. R. Crisler

J. M. Conrow

R. F. Bobbitt

J. W. Green

P. Repino

L. M. Raymond

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at the Plant Maintenance and Engineering Show

Cleveland Public Auditorium, January 26-29

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Pick Up Auditorium Floor Plan at the Show

PLANT ENGINEERING is not publishing a floor plan of the Plant Maintenance and Engineering Show, because . . .

First, the only readers interested (those attending the show) can get a far better floor plan than any that could be published in a magazine.

Second, such a floor plan would take at least two full pages of space and would be of no use to those readers who will not be going to the show. These pages are being used instead for articles of interest to all readers.

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General Management Views the Plant Engineer

TOP men in the general management of American industries are remarkably well informed regarding the valuable contributions made by their plant engineering departments. This was forcefully demonstrated to Plant Engineering's reporter who interviewed a group of these men, men who represent several of America's "blue chip" companies.

Probably many plant engineers know the esteem in which they are held; others may not. Nevertheless, we know that all plant engineers will be interested in reading the following pages. The comments show that presidents and vice presidents of the country's largest firms acknowledge the contribution of plant engineers to industry.

Not only was management well informed regarding the work being done by plant engineers, but all enthusiastically acclaimed the imagination, intelligent planning, and cooperation displayed by their plant engineering staffs. As one executive put it, "When management asks a question, our plant engineers are usually the people who come up with the answer." Or, as another one said, "What can a plant engineering department contribute to a company? It can keep it from going broke!"

All told, these comments point to one significant fact: the future of the plant engineering group in industry is bright indeed.

Interviews in each case were conducted by Marjorie Weissman, Associate Editor, Plant Engineering. We would like to express the editorial department's gratitude to the men who graciously participated in these interviews.

Likes What It Sees and Tells Why.....

From Johnson & Johnson

Claude V. Swank, V. P. of Manufacturing: ***"Our plant engineers 'call the shots' to our various departments and, while they make the final decisions, they always talk in terms of 'we.'"***

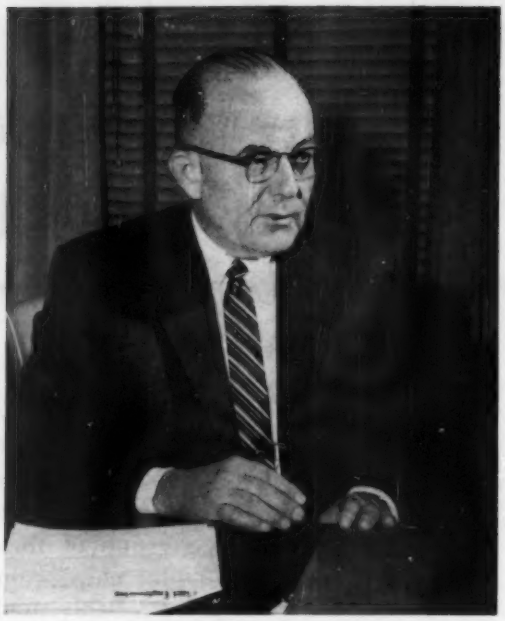
"Adequate service and facilities are necessary prior to any other sort of engineering activity on the process areas in our plants, and good design of a facility will enable later economical accommodation of new processes which are continually being developed. These facts are the basis of the importance of the plant engineering function in our company. I know the work our plant engineers and their departments do—I walk around the plants to see for myself—and I know that they are contributing very largely to savings.

"There are two divisions of the plant engineering function—Project Engineering and Design and Development. One of these division, Project Engineering is responsible for plant maintenance, new facilities, and for buying standard machinery and equipment, while the second group, Design and Development, is concerned with the design and development of special machinery.

"While the plant engineers 'call the shots' to our various departments, in order to serve them as well as possible, and while they make the final decisions on a job, based on their knowledge and skills, we are proud that, up to that point, it is a matter of team work among all our people. Our plant engineers, when working on a project with other departments, always talk in terms of 'we' because there is a fine spirit of teamwork between them and the manufacturing groups.

"We believe that in the future, an even higher caliber of man will be needed in this job."

From United States Steel Corporation



Charles H. Williams, Administrative V. P. i/c Engineering: ***"The plant engineer is at the source of our problems, conceives the solutions and directs the intricate steps of execution."***

"Our plant engineers? I don't know how we would get along without them. The plant engineer and his associates are the real key to the quality of our engineering performance. He is at the source of the problems, conceives the solutions and directs the intricate steps of execution. If he and his people do not have what it takes, the results will not be what is desired. There is no substitute for good engineering at the plant level.

"The plant engineering department is entirely responsible for the detailed planning of new facilities as well as for the replacement of equipment and for specifying new equipment for expanded operations. A tremendous program is getting under way now, which is quite typical. In fact, it is difficult to pick out any exceptional jobs our plant engineers have done—we think they are doing a fine job all along.

"Although I do not foresee any fundamental change in the plant engineering function, its responsibilities and technical knowledge will be stepped up and its activities more intense and varied. More specialized technicians will be needed in the maintenance department to keep complicated equipment tuned up and running, while different techniques and different kinds of knowledge will be needed in plant engineering phases of the work.

"There is a trend towards more business knowledge and more consciousness on the part of the plant engineer of the financial effects of many projects proposed. While staffs will not necessarily be larger, they will be better."

From Monsanto Chemical Company

Felix N. Williams, Director and V. P., Manufacturing: *"When management asks a question our plant engineers . . . . are usually the people who come up with the answer."*

"In plant engineering, we have gone beyond the time of the master mechanic who is responsible only for plant maintenance. The work now needs men with a sound background of engineering. Our plant engineers, who have been responsible for some very dramatic and significant developments in our company, have always been of utmost importance to us.

"With the increasing complexities of modern chemical processes, we have to keep increasing the caliber of the men in our plant engineering departments and, from our standpoint, we see the need for the continuing development and training of men in plant engineering. There will, for example, be new and better instrumentation required. To a large extent, the responsibility for this will lie with the plant engineers.

"Continuity of operation in this industry is of utmost importance and we are very proud of the fact that some of our plants run 99 per cent on steam. Much of the credit for this is due to our plant engineers.

"When management asks a question, our plant engineers, or our Technical Service group, which is substantially a central plant engineering department, are usually the people who come up with the answer.

"Through monthly reports from our divisions, a section of each of which deals with the plant engineering function, I get the highlights of everything that goes on in our plants. And I think our plant engineers are doing a fine job for us."

From Lever Brothers Company

John P. Moser, Production Vice President: *"Some companies have failed, I believe, simply because they were too parsimonious to let their plant engineers keep the plant in good order for them."*

"What can a plant engineering department contribute to a company? It can keep it from going broke!

"Running a plant is like keeping a house in order—you have to keep the machines running and the plant in good repair. Our plant engineering department does that for us, and we try to help them. Some companies have failed, I believe, simply because they were too parsimonious to let plant engineering keep the plant in good order.

"We respect our staff and engineering function and encourage our engineers to keep up to date by reading books, magazines, catalogs and so on. We also encourage them to see people who want to talk with them, even if it seems rather pointless at the time-we never know what we may learn. To us, these attitudes make a lot of sense.

"Our plant engineers contribute to the company in many ways-with new ideas; by modifying standard equipment; by improving instrumentation. Some of the devices they work out are very simple, others very complex, and a quarterly report on these projects already completed is issued to anybody in the company interested in seeing it.

"We do foresee changes in the plant engineering function. With the development and use of more automatic controls, the plant engineering function itself will develop. Maintenance, which in our company reports to the plant engineering department, will be upgraded, and if you already have good trades men they will be quite capable of taking on this new work load."

From Thermoid Company

Warren E. Hill, President: *"Our plant engineers not only carry the ball in getting money-saving jobs done, but also have the say in the provision of new facilities and modernization projects."*

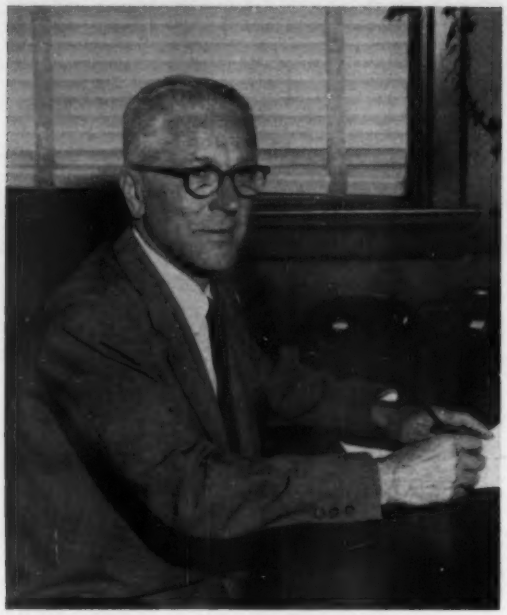
"The only way to keep efficient, competitive and abreast of the times is to make company functions dynamic, and this applies to plant engineering too. There is good exchange of information in our industry and we encourage our plant engineers to attend meetings and read books and magazines that will keep them informed about their work.

"They are responsible for buildings and equipment with a combined capital value of nearly 20 million dollars. They contribute to our company economically by running a strong preventive maintenance program and by keeping equipment running well, and are responsible for substantial savings throughout the plant.

"Our plant engineers not only carry the ball in getting these money-saving jobs done, but they also have *the* say in the provision of all new facilities and modernization projects. Moreover, our plant engineers are well represented in all conferences held to formulate company policy and plans for modernization and new facilities.

"Our plant engineers make many worthwhile contributions to the company and we are constantly replacing and upgrading skills as demands for new talents come upon our horizons. As for the future, the problems of the company will become more and more complex, making it necessary to upgrade our research and development facilities. Because of this, the plant engineering function will become more important to us."

From Chicago Hardware Foundry



Frank J. Sherwin, President: *"The plant engineer is invaluable in solving problems of changes in production methods and evaluating contemplated purchases of expensive equipment."*

"We should recognize the fact that our plant engineers are becoming increasingly important. The old-time "plant engineer" with a wrench in his hand won't do any more. Just as fast as we improve our processing methods and go to automation, our plant engineers must improve to keep pace.

"Better skilled and better educated men will be needed in the plant engineer's department. The plant engineer must be ahead of the game, otherwise he will find that he cannot handle new and more complicated equipment as it comes into the plant. Better trained technicians, especially in electronics, will be needed as control equipment becomes more complicated and, because of the increasing use of compressed air and hydraulics, the plant engineer will need men who understand fluid dynamics.

"The way I look at it, probably the principle advantage of good plant engineering is that I don't have to worry about costly interruption of operations.

"Secondly, the plant engineer is invaluable in solving problems of changes in production methods and evaluating contemplated purchases of expensive equipment and other important expenditures. The plant engineer evaluates these proposals not merely in terms of money to be spent, but whether or not the proposed equipment will stand up in service, and it can be readily repaired. Also it is important that they keep informed of time and labor saving devices of all kinds.

From Western Electric Company, Inc.

H. V. Schmidt, V. P., Plant Design and Construction: *"Major Construction projects completed during 1958 under the supervision of the Plant Engineering Organization, cost $100,000,000."*

"Western Electric's plant engineering department has complete responsibility for the erection of new facilities for our company, as well as the design and construction of all plant expansions and modifications. Altogether, it is functionally responsible for plant facilities worth more than $300,000,000 capital value. It is expected that new facilities valued at $50,000,000 will be added each year during the next five years. Major construction projects completed in 1958 alone, which were designed under the supervision of the plant engineering organization, added approximately five-and-one-half million square feet at a cost of about $100,000,000.

"Our plant engineers are also jointly responsible with other departments for the selection of sites in all parts of the country for both manufacturing plants and for distribution centers.

"In the post-war years, they have been responsible for significant changes in the general design and location of our plant facilities. Recent trends have been toward fully air conditioned office space and, where the process demands it, in plant areas.

"It does not appear that automation of equipment will materially affect the function of the plant engineering group. However, as products and equipment become more complex, so do the problems of designing and building structures to accommodate new operations, power distribution systems to take care of increasing loads, air conditioning systems, lighting systems for critical visual work and many other facilities."

From Corning Glass Works

A. H. Weber, V. P. and Director of Engineering and Manufacturing: *"Our plant engineers contributed substantially in providing a better plant layout and lower costs."*

"Ten years ago, our plant engineering department would not have had time to design a plant. This would have been done by an outside firm. But during the past year, a highly specialized, multi-million dollar plant has been completed at Greenville, Ohio, to which our plant engineers contributed substantially in providing a better plant layout and lower costs than would have been otherwise possible.

"Growth of our plant engineering department has been faster than that of any other department in our company, and the men in it are of considerably higher caliber and more professional than even five years ago. And at that time, the caliber of the department was higher than ten years ago. I think this trend will continue.

"We also see our maintenance operations being upgraded and, possibly the emergence of a new technical group, above the trades men, but below the professional engineers, who will be responsible for instrument maintenance and maintenance of our modern machinery.

"Sometimes our plant engineers work independently, sometimes in cooperation with an outside firm, as with the Greenville, Ohio and the New Bradford, Pa. plants where they were assisted by engineers of Day and Zimmerman of Philadelphia. But at our Big Flats plant, near Corning, they were responsible for design and construction of the entire plant.

"I am well aware of the very substantial contributions made by our plant engineers."

PARKING LOT STUDY

Good Space Utilization and Close User Control Pay Off

By BURKE W. WOMBACHER, Plant Engineering Consultant, Redondo Beach, Calif.

PROBLEMS OF planning and layout of parking lots have grown through the years with concepts continuously changing. The plant engineer of today must deal with these increasingly complex problems.

Prior to World War II the problems of parking were relatively simple. The mills and other industrial plants were usually located at the edge of towns and the surrounding unpaved lots, fields, and streets provided ample room for parking and plant expansion.

Then the mushrooming of industry, housing, and other factors during the war and post-war years rapidly began to increase the plant engineer's parking lot problems by decreasing the amount of "free" space available for parking. As with many problems that just seem to grow until suddenly they reach critical status, we have to pause and review and analyze the factors that brought this problem to the boiling point.

1. The ever increasing number of automobiles. We now have an estimated 50,000,000 jamming the streets and highways and at the end of their runs requiring parking space, mostly around our industrial plants.

2. The growing trend on the part of local governments to eliminate curb parking in order to speed up traffic flow. This forces plants to provide more and more off-street parking.

3. The decrease in public transportation vehicles. Here in the metropolitan Los Angeles area only a very limited amount of public transportation still exists.

4. The past trend to more generous spacing in parking lot layouts. This was brought about by a number of reasons such as improving employee morale and speeding up traffic flow in the lots.

5. Another trend that grew was parking area segregation or the elimination of catch-as-catch-can parking. We now commonly find separate parking areas for production workers, engineers, office workers, share-the-riders, medical handicapped, executives, visitors, and others.

6. Expansion of housing into the former suburban areas, which completely enveloped many large plants making parking or plant expansion impossible.

On the other side of the ledger that there has been little of anything to help improve our plight. Some small help has come from the following:

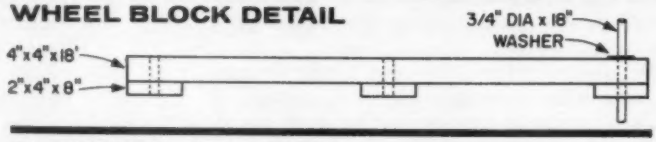
1. The increase in number of the small sports cars have helped us some. We now find that we can utilize the ends of parking rows and other cramped small spaces that were formerly useless, for parking scooters and sports cars.

Given certain measurements and amounts, the factors in this table will help determine other needed parking lot dimensions to give greatest lot utilization.

STANDARDS FOR INDUSTRIAL PARKING LOTS

To Find:	Do This:
Number of parking spaces required	Take the number as being one-half the number of employees on largest shift
Total area required, in square feet	Multiply number of spaces required by 270 sq ft
Total area required, in acres	Multiply number of spaces required by 0.0062
Number of spaces obtainable from a given area	Divide the area in square feet by 270
Best method for layout of area	First try 60 degree parking around entire perimeter, then rows in center

WHEEL BLOCK DETAIL



PARKING STALL DETAIL

Rule for Spacing

$$X = \frac{8 \text{ feet}}{\text{sine of parking angle}}$$

Examples:

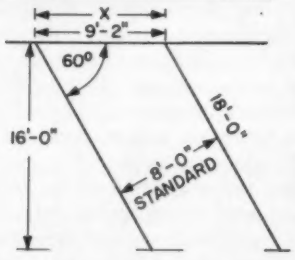
$X = \frac{8 \text{ ft}}{0.866}$ = 9 ft-2 in. for 60 degrees

$X = \frac{8 \text{ ft}}{0.707}$ = 11 ft-1 in. for 45 degrees

$X = \frac{8 \text{ ft}}{0.500}$ = 16 ft-0 in. for 30 degrees

Note: Sines of angles taken from any table of natural trigonometric functions.

Standard stall width at all angles: 8 ft-0 in.



Aisle Spacing Between Rows

90 degrees—22 ft to 24 ft
60 degrees—18 ft to 20 ft
45 degrees—12 ft to 14 ft

2. Share-the ride campaigns have helped to reduce the problem very successfully in some areas, but have failed in others.

3. Layouts have been tried using circles and odd angles such as 50 and 65 degrees. These usually result in the gain of one or two more spaces in long rows, but otherwise have little effect.

It would be very easy to blame our present predicament on a lack of planning on the part of those who preceded us, but this would be unfair. They obviously showed foresight in most cases by selecting suburban locations that provided expansion room at the time.

Surely we could not expect them to be prophets and we must recognize that our actions today may be no better. However, we can be expected to do better as we learn and we have this past experience record to guide us.

Here are some of the actions that are being taken today to solve or escape this problem:

1. Some plants are packing up and relocating to what are now isolated or suburban areas, perhaps only to be engulfed again.

Other growth organizations are expanding by breaking up into divisions occupying a number of new locations, perhaps only to face multiple instead of single problems later.

2. Some are providing shuttle bus service, at heavy expense, from off-site parking lots.

3. Share-the-ride campaigns are being given increasing emphasis and these are helping the problem substantially in many areas.

4. Parking lot layouts are being reviewed and changed to improve area utilization. I had always believed that 90 degree parking resulted in maximum utilization until the other day I saw such a layout changed to 60 degree parking. There was a gain of six standard size stalls and also an excellent improvement in traffic flow.

5. A reverse trend is doing away with segregation and there is a return to a modified or all out catch-as-catch-can parking system in a number of places.

Others are modifying their segregation systems, and a very successful plan is to oversubscribe such lots on a calculated basis. This means that you give lot passes to say 100 more cars than the lot can possibly hold because the lot shows an average of 100 vacant spaces every day. These 100 vacancies represent the passes that are absent because of vacations, sickness, business, etc.

Above all else we must be impressed with the importance and necessity for a Long Range Facilities Master Plan. Using past experience as an example we must plan for the future.

Full development of the plan will require information from general management on finance, firm and programmed business, new products, sales forecast, etc. So it happens that neither group —plant engineering or general management—can function effectively without the other. They are brought together by the necessity to function as a team.

As parking lot layout will be an important factor in our long range planning we will be doing a lot of work in this area again. We are showing in the chart attached what we consider to be good general industrial plant standards for parking layout.

There are many other methods of parking lot planning such as ratio of parking spaces to sales, ratio to production area, etc., but in our opinion these are all too complicated and of doubtful accuracy so we prefer the simpler methods. **End**

New Type Filter Recovers Talc, Cleans Air at Barrett

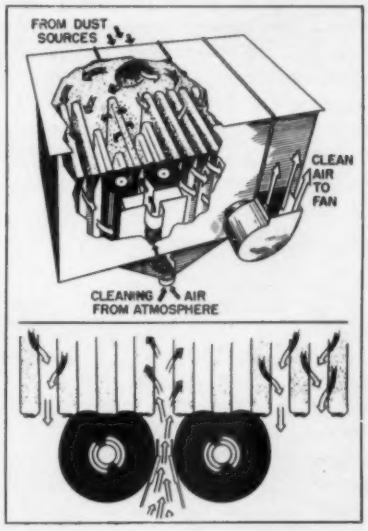
AT ITS BIRMINGHAM, Alabama, plant, Barrett Division, Allied Chemical Corporation makes granule-coated composition roofing. During one stage of manufacture, talc dust is applied to the material, and it was at this point that a dust problem arose. Effective local exhaust ventilation was required to capture the air-borne talc dust while a newly-designed dust filter was installed to recover this dust for reuse and to discharge a cleaned air stream.

Plant engineering personnel and field engineers of the W. W. Sly Manufacturing Co. made a thorough study of the problem, and subsequently designed and installed a complete dust control system.

Air being handled is ambient plant air with a low moisture and asphalt fume content; possible moisture condensation in the bags of the filter was thus no problem in this application. Because the roofing machine operation is continuous, a self-cleaning automatic dust filter was required. The unit selected was a Roll-Clean dust filter. Selection of this specific unit was based on estimated installed price, together with the consideration that the Sly organization would undertake responsibility for the entire job including field installation.

Talc dust travels from the hood over the talc application roll to the air filter through a piping system fabricated from black iron of all-welded construction. Flanged joints in each section facilitated installation; they also will permit easy disassembly. **End**

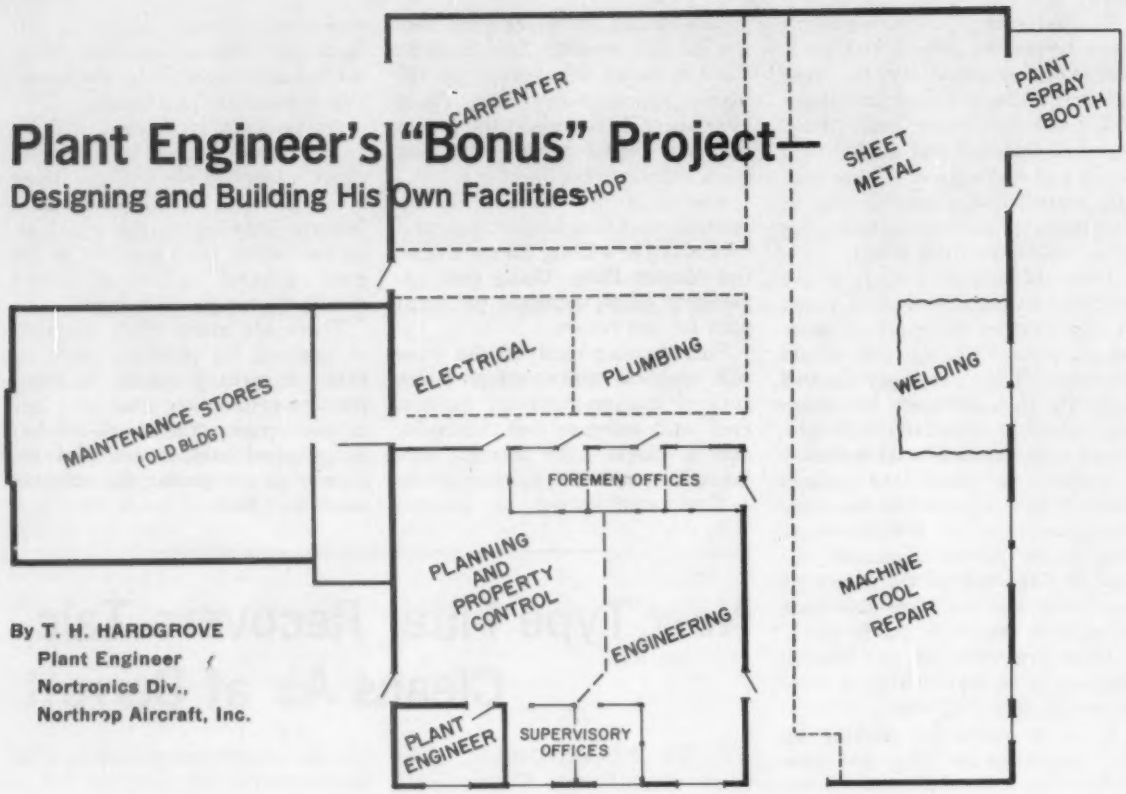
Top view shows dust entry into filter, passage of dust-laden air through filter bags and clean air exit. Bottom view shows positive seal provided by rolls.



Plant Engineer's "Bonus" Project—

Designing and Building His Own Facilities

By T. H. HARDGROVE
Plant Engineer
Nortronics Div.,
Northrop Aircraft, Inc.



IT ISN'T OFTEN that a plant engineering department has the opportunity to design, build and tool its own operating facility. When we in Plant Engineering at the Nortronics Division of Northrop Aircraft, Inc., Anaheim, Calif., were given this opportunity, we were determined to make the best of it. We wanted, primarily, to avoid the many inconveniences and lack of departmental unity which so often exists when a plant engineering department is forced to occupy "available space," rather than facilities specifically suited to its needs.

Five-Section Work Force

Our department, which averages about 85 people, is divided into five sections: (1) Planning and Property Control, which maintains all records, plans maintenance systematically, and accounts for all the property in the plant; (2) Engineering, which accomplishes all the design, layout, and drafting work required by the department; (3) Plant Maintenance, which takes care of all janitorial work, carpentry work, painting, etc.; (4) Mechanical Maintenance, responsible for all machine tools and other mechanical equipment; and (5) Electrical Maintenance. While planning our new building, we wanted to give each of these sections separate work space and a degree of autonomy—but not at the expense of over-all departmental unity and cooperation.

Our building is of prefabricated metal, with 8000 sq ft of floor space. It is located toward the rear of the plant site, midway between the two large production buildings which require most of Plant Engineering's attention. Walls of the building are of galvanized steel panels; the roof is of aluminum, chosen for its superior reflectivity.

A 14-ft overhead clearance was maintained throughout, so that if it is ever necessary to use the building as a production facility, clearance will be adequate. A slab was laid at the rear of the building, for outdoor storage of incoming raw materials. It is planned to eventually cover this area with a shed roof, and then install a large battery charger for servicing lift trucks.

Another slab, laid along the side of the building, contains a water-wash paint booth which was moved into position intact

Fig. 1. Author Hardgrove, center, with supervisors Hal Duffey, left, Property Control and C. B. Hill, Engineering.

and fitted against an opening left in the main building wall.

The building proper has three main divisions—a separate stockroom and tool storage area (in an old building against which the new building was built), office space and a shop. The office space, approximately 1900 sq ft in area, runs part way along the front of the building, and contains the Planning and Property Control and Engineering sections, as well as the Plant Engineer's office.

The office division is air conditioned, and contains indirect fluorescent lighting that delivers approximately 120 ft-c of illumination at working level. Modular panels were used to partition a portion of the engineering area so that a degree of privacy could be obtained for the Property Control and Engineering supervisors.

Private offices of the foremen —electrical, plant maintenance and mechanical maintenance—are also located in the general office area, but are separated from the remainder of the office by glass and plywood panels. There is no entrance into these offices from the general office; instead, a door leads outward from each office into the specific shop area over which the foreman has charge. Windows permit each foreman to keep in visual contact with his shop area. Thus, while providing each foreman with the quietness and privacy of the main office atmosphere, the building layout keeps him physically and visually in contact with his shop area.

Shop Area Layout

The L-shaped shop area encloses the general office area, including the three foremen's offices. The short leg of the L contains the machine tool repair shop. The long leg contains electrical, carpentry, plumbing and sheet metal shop areas, as well as welding facilities and the built-on paint booth. There are no panel divisions between these shop areas, and tooling is located where it is most convenient for general use.

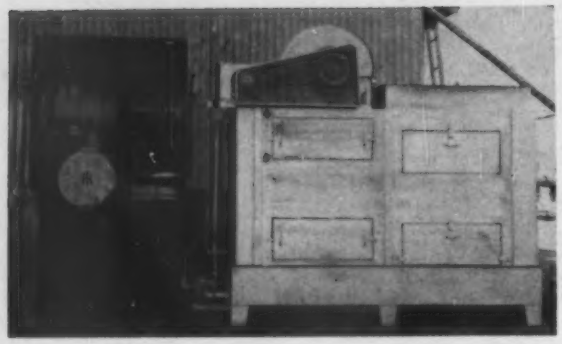
While the shop area is not air conditioned, it is provided with several ceiling-height suction fans which maintain a steady exhaust of heated air from under the roof. Here again fluorescent lighting is used, delivering 80 to 100 ft-c of effective illumination at working level. Tooling in the shop provides for the majority of all jobs occurring in the plant engineering category. This includes adequate testing and checking facilities, as well as general tools. Practically any plant engineering work that is required can be accomplished in our own shops without recourse to production shop facilities.

This new facility, with its layout and its tooling, is ideally suited to our needs. It provides autonomy for the different sections of the department, without affecting cooperation and correlation of efforts. Working areas are pleasant, sufficiently roomy, well lighted, and convenient . . . factors all contributing to personnel morale and efficiency. **End**

Fig. 2, right. Office area of Plant Engineering building provides semi-privacy for supervisors, along windows at right. Engineering and Property Control personnel share open area.

Fig. 3, below. Carpenters' and electricians' areas in shop. Doors in background lead to individual shop foremen's offices. Fluorescent fixtures are suspended from ceiling.

Fig. 4, below, right. Machine shop is fully equipped to handle mechanical maintenance and repair. Prefabricated metal framing, siding and sash are shown in background.



When cooling tower became favorite "watering place" for neighborhood pigeons, water became contaminated, seriously affecting operation of air compressor. Problem was solved by installation of evaporative condenser.

This Condenser Is Not "For the Birds"

By FRED SEVAGLIO, Plant Manager, Drayer-Hanson Div. of National-U. S. Radiator Corp.

WHEN THE 125-hp shop air compressor at Drayer-Hanson Division of National-U.S. Radiator Corporation, Los Angeles, Calif., began to chronically overheat, our Plant Maintenance department followed a logical course of action. They completely disassembled the compressor to determine the cause of the overheating, to correct the fault, and to repair any possible damage.

Upon examination of the disassembled components, it was found that while all parts in the compressor cooling system exhibited a normal amount of calcium deposit, a more serious defect was the presence of a large amount of sewage which had gathered on the cooling surfaces of the parts and was acting as an insulator.

It was not difficult to determine the cause of these sewage deposits. We had been using a 15-ft-high conventional redwood water cooling tower for cooling the compressor water, and this water tower had become a favorite "watering place" for an overpowering number of neighborhood pigeons. While the gross droppings from these birds could have been easily filtered out, the microscopic algae contained in the droppings was another problem. These algae will pass through any conventional filtering system, then grow and multiply to form the sewage deposits.

The components on both the high and low sides of the compressor were completely dismantled, inspected, cleaned, and metal sprayed where necessary. All valves were ground, cylinders rebored, and new rings were installed. All plumbing and piping was replaced with new to make certain that no hidden calcium or sewage deposits would remain in the reconditioned system.

Condenser Installation

We then tore down the old 15-ft water tower and installed a standard, company-built dry fan evaporative condenser just outside the air compressor building. Hot dip galvanizing on all exterior portions of this condenser makes outside installation feasible. The cooling system in this condenser will remove up to 300,000 Btu of heat per hour. Power requirements are limited to a 1½-hp motor for the fan, and a ⅓-hp motor for the pump which operates the sprays.

Two water systems are involved in the new installation. In one system, the water circulates through the copper tubes in the condenser, the air compressor cooling system, and through a surge tank installed inside the building near the compressor. A float valve in this surge tank admits additive water when needed. We also installed a water purification system in this surge tank, which by means of a constantly dissolving water additive, eliminates calcium and any algae that may be present. This technique was developed by Water Chemists, Inc., of Los Angeles.

The second water system consists of the water which is sprayed over the copper tubes in the condenser. The spray nozzles are so positioned that the spray mixes with the downblast air stream from the fan directly above the copper coils. The used water accumulates in an open pan below the coils, then is pumped again through the spray nozzles. This particular circulating system is thermostatically controlled so that it operates only when needed. The water in the first system circulates whenever the compressor is running.

Both water systems are closed systems, so to speak, as the water is constantly reused. Only a small amount of make-up water is required by the surge tank system.

Only routine maintenance is required, including periodic inspection, lubrication and monthly additions of the slowly dissolving chemicals in the water purification device. Total cost of the new installation was approximately $3000. Life expectancy of the condenser is about 10 years for all moving or operative parts and much longer on the structural components. **End**

To have a top-notch maintenance organization, it is important that one give serious thought to contributing factors such as planning and scheduling, records, reports, inspection, lubrication, work requests or orders, preventive maintenance, corrective maintenance, and work force control. Here are various facets of maintenance management procedure used by one firm and touched upon in this article.

PROCEDURES FOR MAINTENANCE WORK CONTROL

Do you run your plant or does it run you? . . . Do you have days when the roof seems to fall in; when everything seems to be breaking down at once? . . . Then there may be times when things go along pretty well, with only minor disturbances . . . It's a case of peaks and valleys, in repairs accompanied by corresponding fluctuations of costs charged to production departments . . . Extra manpower may be concentrated on "spot fires" which occur too often . . . These emergencies sometimes cannot be avoided but they can be reduced in frequency and seriousness. How? . . . Through the planned development, careful application, and periodic appraisal of a maintenance management procedure system, which has the support of maintenance as well as production personnel . . . To have a good maintenance management system is good business . . . It can mean money in the bank . . . It can provide you as a plant engineer with the information that you can use to set up budgets, watch costs and see that your work force is handled more effectively . . . The techniques and procedures described in this article were developed by Union Carbide Metals Company, Division of Union Carbide Corp.

PROCEDURES FOR MAINTENANCE WORK CONTROL

BEFORE TAKING a closer look at the different elements of the over-all management procedure, let's note some of the steps necessary for the progressive development and application of a management program:

1. Organize administrative maintenance details.

2. Examine the classification of accounts with the cooperation of production people and see that proper charges cover items on which costs should be accumulated.

3. Set up maintenance service schedules. Consult with production personnel on this; take into account outside manufacturer's recommendations and experience.

4. In conjunction with step 3, prepare equipment history folders.

5. Establish practice of using repair orders on all jobs. Get together with production people on charges.

6. Inform maintenance foremen of the desirability of having labor estimates on individual jobs. Simply ask them the number of men and the length of time that each job will take. Make spot checks to evaluate foremen's estimates.

7. Make a weekly schedule of maintenance work. Ask production personnel to cooperate by submitting work for the coming week in time for advance scheduling.

8. Prepare routines for equipment inspection.

9. Inventory the craft skills in the maintenance department. Determine how many are capable of doing satisfactory work in their job classification.

10. Determine the effective working time obtained from hourly personnel through work sampling.

11. Avoid delays in the program by establishing adequate stock levels.

12. Set up an apprentice program for a continuing supply of trained personnel.

Even though planning and scheduling is used as a title in a singular sense in the system with which this article deals it represents two distinct functions. Planning and scheduling of maintenance work in a pro-

Mr. Avery
RB-139
Dept. 060-TG

SCHEDULED MAINTENANCE WORK

Week Ending 10/6/57

Charge	Order No.	Craft	Description	Foreman	Mon	Tue	Wed	Thu	Fri
		Milwts.	Assigned inspect & repair elevator.	Franz			8		
		"	" " " " sludge pumps.	Sitko	8		8		8
		"	" general inspection.	Leach				8	
		"	" repair & balance fan.	Sitko				8	
		Bldg. Mnt.	" sand blast "	Byer			16	16	16
		Sht. Metal	" general repairs	Oles	4	4	8	4	4
		Acet. Welder	" " "	Anderson	4	4	8	4	4
		Elect. "	" " "	Anderson	4	4	8	4	4
040-04-0601	32152	Milwts.	Repair No. 3 Stone Feed.	Sitko			24		
" " -0301	32151	"	Charge Trunnion Roller.	Leach		32	48		
" " -0301	32164	"	Renew bearings on seal ring bar.	Leach			16		
" " -1000	11840	"	Overhaul Lime dust collector.	Franz		32	32	32	32
" " -0302	32166	Sht. Metal	Weld leaks in cool pipe, rods, etc. - No. 3 Unit.	Oles			8		
" " "	"	Acet. Weld.	" " " " " " " " " "	Anderson			8		
" " "	"	Elec. "	" " " " " " " " " "	Anderson			8		

duction department must include the participation of the foreman of the particular production unit concerned. If for a good reason the maintenance department cannot take care of work according to schedule, it has the responsibility of letting the operators of equipment know in advance.

Under the planning phase, the following are items to be considered: 1. Reason for the work. 2. Who is going to do it. 3. Scope and method of doing the work. 4. Location of work, or where it should be located. 5. Material procurement. 6. Determination of completion dates.

On the other hand, the scheduling operation involves the following: 1. Setting up job priorities. 2. Timing various portions of the over-all job to meet the completion date. 3. Sizing manpower by crafts and specifying numbers and when needed. 4. Getting material and equipment on the job at the proper times.

All jobs in the plant using the management program discussed call for planning; minor ones are handled by craft or shop foremen who informally check such details as material availability, manpower, and completion requirements. Other jobs require more detailed planning and call for meetings of various people concerned. Such meetings include engineering, maintenance, and production department personnel.

After the necessary information has been worked out for a job in the major category or classification, pertinent entries are made on a sheet of paper. This paperwork calls for a job sequence description, or a bar graph, or a combination of both. The bar graph shows when work is to be completed and who is to do it.

With the exception of emergencies, all work is scheduled on a weekly basis starting with Monday and including the following Sunday. See Fig. 2. Some jobs are included as "pot boilers" but can wait and men can be reassigned without unduly hurting plant operations.

Job scheduling is handled by the craft foreman concerned and a master mechanic's staff man. For an estimate of the man-hour requirements the craft foreman utilizes past performance information and available standards.

Of course, job priority based on

MAINTENANCE JOB MANNING SCHEDULE

Craft: Millwrights Foreman: O'Brien No. Men: 9 Man Hours: Week Ending: 8/12/57

Order No.	Charge	Estimate		Job No.	Pri.	Description of Job	Mon		Tue		Wed		Thu		Fri	
Brown-Schmidt	136	2	80	1	2	Assigned general repairs	16	16	16	16	16	16	16	16	16	16
	136	2	16	2	2	Assigned general inspection					16	16				
000-04-1300		1	32	3	3	Repair chills	8		8				8		8	
		1	32	4	3	Repair Chills		8	8	8	8		8	8	8	8
Vacation		1	40	5		Kline	8	8	8	8	8	8	8	8	8	8
160-04-0607	05049	3	54	6	3	Overhaul No. 7 generator					16		24		24	24
136-04-2821	05070	2	16	7	3	Repair relief doors No. 2 Dynacione	16	16								
161-04-1101	09252	2	16	8	3	Install bearings on heater fan - bldg. 10			16	8						
443-04-5000	00355	2	16	9	4	Barber Green Conveyor - repair belt	16									
160-4-	01817	1	8	10	4	Overhaul Spare reducer			8							
Acting Foreman		1	40	11		Riley	8	8	8	8	8	8	8	8	8	8
160-04-0606	05078	2	8	7	2	Change motor on No. 8 gen. water pump		8								
160-04-5000	05077	2	8	7	2	Change grease fittings on fog tower pump						16		8		
Sick Leave						Romano		8		8		8		8		8
136-04-0612	05075					Change belt on granulator				16						
060-04-0304	37340	2	8	6	2	Change motor on cooler at lime kiln								12		
136-04-0407	05077	2	8	6	2	Replace shaft in granulator								4		

Fig. 2. Estimates of men and man-hours required are shown in color at left of form. Tinted digits, at right, indicate scheduling; actual man-hours are black.

Fig. 3. This manning table illustration shows how a running record has been kept of the actual number of men used in crews weekly in comparison to set standards.

MANNING TABLE FOR DEPARTMENT

Estimated By:
Approved By:
Prod.
Hrs./Wk.

Occ. No. and Job Name	Standard Crew	Total	Actual 8/23	8/30	9/6	9/13	9/20	9/27	10/4	10/11	10/18	10/25	11/1
			Actual Number on Pay Roll										
Electricians - Ref.	1		1	1	1	1	1						
A	7		7	7	7	7	7						
B	6		6	6	6	6	6						
C	5		8	8	8	8	8						
Helper	3		3	3	4	4	4						
Meterman	2		3	3	3	3	3						
Telephonemen	2		2	2	2	2	2						
Electric Motors	1		1	1	1	1	1						
Motor Oilers	3		3	3	3	3	3						
Leaders	2		2	2	2	2	2						
Blacksmith A	2		2	2	2	2	2						
" B	2		1	1	1	1	1						
" Helpers	2		1	2	1	1	1						
Engines & Boilers A	4		4	4	4	4	4						
" B	2		4	4	4	4	4						
Stationary Engineer	1		1	1	1	1	1						
Garage Mechanics	4		4	4	4	4	4						
Service Man	1		2	2	2	2	2						
Helper - Eng. & Boilers	0		0	0	0	0	0						
Crane Repairs Leader	1		1	1	1	1	1						
" A	7		6	6	6	6	6						
" B	3		4	4	4	4	4						
" Helpers	1		1	1	1	1	1						
" Oilers	1		1	1	1	1	1						
Crane Motor Oilers	2		1	1	1	1	1						
Sewers & Furnaces A	3		4	4	4	4	4						
	68		73	74	74	74	74						

Data By:

operating needs must be taken into account. Information pertaining to production requirements is disclosed in production conferences attended by the plant engineer who must keep the maintenance department posted.

Now as to records, it is advisable for the plant engineering department to have a dependable collection of paperwork for the determination of manpower requirements, checking equipment performance, planning work, and estimating. The following records are useful:

1. Analysis of work backlog. (Past and future work should be compared to determine maintenance crew size.) See Fig. 2.
2. Manning table to indicate standard crew needed for an average amount of work to be done. See Fig. 3.
3. Maintenance budgets for the production departments.
4. Work load distribution by production departments for leveling out efforts.
5. Overtime analyses to spot recurring emergencies.
6. Equipment histories in folders which also are to include completed repair orders.
7. Maintenance service instructions in card form including information on lubrication, inspection, overhaul and cleaning. See Fig. 5.
8. Cost standards for repetitive jobs. See Fig. 6.
9. Reports of building inspection, useful in budget determination work planning and condition appraisal.

It is also well for a maintenance organization to require a certain amount of reporting. Reports not only help keep supervision informed but are also useful for: 1. Budget and estimate preparation. 2. Gaging and bettering the maintenance program. 3. Setting up manpower needs. 4. Getting a picture of the over-all operation. 5. Distributing the work load. 6. Cost analyzing, controlling.

Reports which if properly handled present data of value to the maintenance organization are:

1. Monthly record of completed orders and costs charged to them. The record should carry identification of departments which were charged for work, numbers of repair orders, job identifications, estimated labor, actual labor costs, actual material costs, and totals of labor and material costs.
2. Monthly report of open orders indicating work started but not completed. Through this report one can get a picture of estimated labor distributed to such orders.
3. A weekly maintenance backlog report designed to show, by craft and type of repair order, work to be done in individual production departments.
4. Monthly detailed report of material used in individual jobs.
5. Cumulative report on a monthly basis of charges made by the maintenance department to other departments. This report should show job and shop identification and the respective repair order numbers.
6. Monthly distribution report of labor in all individual departments by craft.

One facet of the system is inspection. Inspection removes the system from a breakdown maintenance category and converts it to a preventive maintenance status. Inspections are made by regularly assigned inspectors or qualified craftsmen. The latter normally take care of the type of equipment to be checked.

Operators of equipment can also make inspections; these can generally be supervised by the head of each production department. The items to be checked appear on the service schedule form for the equipment to be inspected. Inspectors in carrying out their work must not only check the designated items but they must also understand the reasons why they are checking them.

The foreman of the operating department gets a copy of the check list used by the inspector. This list shows equipment conditions and repair recommendations.

The frequency at which inspections are made depends on a time or use basis, whichever comes first. For example, a piece of equipment may be scheduled for inspection every 90 days; this time interval may be reduced if an abnormally heavy use indicates that this equipment should be checked earlier.

Inspection time intervals are entered by the maintenance department on tickler sheets. These are sent out by the maintenance department to both production and maintenance personnel to alert them for

Fig. 4. Variance figures such as these are useful in studying the trends of backlog. Matching work backlog listed for two successive months will show up the variance.

BACKLOG OF MAINTENANCE DEPARTMENT BY CRAFTS

Code	Craft	July Wks.	July Var.	August Wks.	August Var.	September Wks.	September Var.
01	Electricians	8.5		8.6	+1.7		+.1
02	Engines & Boilers	8.2		13.8	+5.5		+5.6
03	Garage	3.1		4.4	-1.3		+1.3
04	Crane Repairs	3.7		4.2	-		+.5
05	Sewers & Furnaces	7.4		6.2	+2.6		-1.2
06	Track Men	-		-	-		-
07	Millwrights	5.5		6.4	+1.8		+.9
08	Sheet Metal	10.6		9.8	+.8		-.8
09	Welders	5.7		5.1	-1.2		-.6
10	Machinists	7.3		8.2	+.5		+.9
11	Pipefitters	11.6		15.2	+2.8		+3.6
12	Structural	5.2		6.0	+3.6		+.8
13	Carpenters	3.8		5.4	-.7		+1.6
14	Bldg. Maintenance	7.8		7.3	+.4		-.5
15	Car Repairs	2.7		14.7	-1.4		+12.0
	Est. Backlog (Monthly Average)			8.62		7.47	

impending inspections and repairs.

Any small job or repairs arising out of the inspection and requiring less than two hours is generally taken care of by the inspector. All other jobs are scheduled according to need.

Building inspection is carried out yearly and each production department gets a copy of the report pertaining specifically to it; that is, the report covers the building in which the particular department is located. The report information is useful in setting maintenance budget figures for the next year.

Lubrication schedules are prepared under the direction of the maintenance engineer or the master mechanic. Check lists are prepared from the original schedules for use by people in the field. Cranes and motors are lubricated by the maintenance department; other equipment is lubricated by the maintenance personnel or operating people depending on conditions. A lubricating committee handles special problems.

To get going on a job, there naturally must be some sort of authorization for work to be done. A commonly accepted form is, of course, the work order or the repair order. See Fig. 8. Such a form is an important factor in the maintenance program. Through such forms costs for specific jobs are collected; with their aid, too, jobs can be sized up in advance as to cost, material and manpower requirements.

It is advisable that individuals authorized to originate repair orders be instructed to make clear and specific descriptions of the work required. Also, the maintenance department should watch the orders for account number accuracy.

A repair order is required for each job pertaining to an individual piece of equipment providing that it calls for four, or more man-hours of labor. Minor jobs are covered by monthly or yearly repair orders. In the use of such blanket orders care must be exercised; otherwise, they become miscellaneous catch-alls.

Responsibility for general maintenance in production departments of the plant falls primarily on the foremen of those departments. Each production foreman is expected to write the orders and plan equipment shutdowns for maintenance.

S—Shift
D—Daily
W—Weekly
M—Monthly
Y—Yearly
O—Operator
AN—Maint. Dept.

MAINTENANCE SERVICE SCHEDULE

Date 3/16/55
Dept. AN - 34
Job & Shop 0734
Equipment Shop Crane No. 2

REMARKS	O'Haul	Clean	Grease	Oil	Inspect	No.	ITEM
AA2 Grease			W-AN		W-AN	1	Bearings - Aux. Hoist
AA2 Grease			W-AN		W-AN	2	- Main Hoist
DTE ex. Heavy Duty				W-AN	W-AN	3	- Bridge
DTE ex. Heavy oil				W-AN	W-AN	4	- Carriage
AA2 Grease			W-AN		W-AN	5	Blocks - Aux. Hoist
AA2 Grease			W-AN		W-AN	6	- Main Hoist
					W-AN	7	Brakes - Aux. Hoist
DTE ex. Heavy Oil				W-AN	W-AN	8	- Aux. Load
DTE ex. Heavy Oil				W-AN	W-AN	9	- Main Load
					W-AN	10	- Main Hoist
					W-AN	11	- Bridge
					W-AN	12	Bumpers
					W-AN	13	Cable - - Aux. Hoist
					W-AN	14	- Main Hoist
					W-AN	15	Controls - Aux. Hoist
					W-AN	16	- Main Hoist
					W-AN	17	- Bridge
					W-AN	18	- Carriage
					W-AN	19	Conductor- Cross
					W-AN	20	- Main Line
					W-AN	21	- Wires & Angles
					W-AN	22	Controls - Std.
AA2 Grease			W-AN		W-AN	23	Drum - Main Hoist
AA2 Grease			W-AN		W-AN	24	- Aux. Hoist
DTE ex. Heavy Oil				W-AN		25	Fan
					W-AN	26	Fire Extinguisher
Crater Cmpd #5			W-AN		W-AN	27	Gears - Aux. Hoist
Crater Cmpd. #5			W-AN		W-AN	28	- Main Hoist
					W-AN	29	- Bridge
					W-AN	30	- Carriage
					W-AN	31	Guards
					W-AN	32	Housekeeping
					W-AN	33	Lights
					W-AN	34	Limitswitch - Aux. Hoist
						35	- Main Hoist
Gargoyle Etna H. Med.				W-AN	W-AN	36	Motor - Aux. Hoist
Gargoyle Etna H. Med.				W-AN	W-AN	37	- Bridge
Gargoyle Etna H. Med.				W-AN	W-AN	38	- Main Hoist
Gargoyle Etna H. Med.				W-AN	W-AN	39	- Carriage
					W-AN	40	Panel - Cab
					W-AN	41	Rails - Main
					W-AN	42	- Carriage
					W-AN	43	Resistors- Bridge
					W-AN	44	- Carriage
					W-AN	45	- Main Hoist
					W-AN	46	- Aux. Hoist
					W-AN	47	Shafts - Aux. Hoist
					W-AN	48	- Main Hoist
					W-AN	49	- Carriage
					W-AN	50	- Bridge
AA2 Grease			W-AN		W-AN	51	Sheaves - Main Hoist
AA2 Grease			W-AN		W-AN	52	- Aux. Hoist
					W-AN	53	Signal
					W-AN	54	Structural
					W-AN	55	Walks & Railings
					W-AN	56	Wheels - Bridge
DTE ex. Heavy oil				W-AN	W-AN	57	- Carriage
						58	
					W-AN	59	Wiring
						60	
						61	
						62	
						63	
						64	
						65	

NOTE—SHIFT & DAILY INSPECTIONS ARE IN ADDITION TO REGULAR WEEKLY INSPECTION

INSPECTOR'S INITIALS

Fig. 5. A service schedule is useful in helping eliminate the omission of checking key items; lubricant specifications in such a form are worthwhile entries to have.

When the foreman writes an order he makes three carbons of the white original—one yellow and two pink. He retains the last pink copy for himself and forwards the rest of the paperwork to the chief maintenance clerk. All repair orders are processed through the latter. In an emergency, a telephone call to this clerk will suffice but must be followed by a confirming repair order.

Scheduling of jobs for an upcoming week is done on Thursday or Friday immediately preceding that week. If a foreman is interested in having work done within a certain week, the repair order must be in hands of clerk prior to scheduling.

Upon delivery to the clerk the repair orders are stamped in a time clock; the white and pink copies are filed for reference and accounting use. The yellow copy goes to the craft foreman, whose men will do the job, so that he can make an estimate.

If the work specified by the repair order requires more than one craft, the clerk writes a cross repair order for the foreman of the additional craft. See Fig. 8.

The yellow copy of the repair order is returned to the clerk after the craft or group foreman writes in the estimated man-hours needed. This is done for all jobs other than routine

work for which man-hour requirements have been established through experience. Material necessities are also analyzed by the foreman but are not entered on the repair order at the time when the man-hour estimate is written.

From the yellow copy returned by the craft foreman, the clerk makes "estimate" entries on the white and pink copies. Then the clerk forwards the white copy to the manufacturing office. The yellow copy is returned to the craft foreman for action and the pink copy is placed in the clerk's files.

After the work has been completed the craft or group foreman returns the yellow copy to the clerk. The clerk sees that any outstanding auxiliary orders for the job are also returned and matched with the original. Then the clerk sends the yellow copy of the closed repair order along with any copies of the auxiliary orders to the accounting department.

Of course, work may come up for which authorization does not originate with production people. Such work requires repair order writing to be done by the maintenance department; examples of accounts charged for such work are construction, stores accounts, and various company divisions.

It is mandatory that great care be taken in handling and classifying not only repair orders but also stores issues and time cards before they are sent to the accounting department. It stands to reason that the accounting department's summation depends on the accuracy of the original information.

No maintenance control program should be planned without due consideration to a very vital feature known as preventive maintenance. Through the latter maintenance work follows planned and scheduled procedures.

The following are a few advantages to be gained from the use of preventive maintenance:

1. Reduction of untimely equipment breakdowns. 2. Lessening of premature equipment replacements. 3. Reduction of emergencies which helps planning and scheduling. 4. Safer working conditions.

A good preventive maintenance program prevents deterioration of a plant from causes other than obsolescence. A constant standard of maintenance in a plant can make its life long-lasting. However, the mere application of a constant standard of maintenance to a plant that is in disrepair will not necessarily result in recovery of the over-all facilities. The plant will simply be put in a "status quo" condition and other factors will have to be considered to give the ailing plant a new lift.

BUILDING INSPECTION REPORT

Date September 13, 1957

Building No. 65 Dept. 22

Item No.	Condition	Remarks	Recommended Action	Est. Cost	Date Repaired
2	Bad	Repair operating platform columns. (Damaged by burn-throughs and misuse of cranes by operating personnel)	Repair immediately.	$ 600.	
6	Poor	Reshoot approximately 100 squares of corrugated roofing.	Replace next spring and summer.	8000.	
7	Poor	Repair brick work on east wall.	Repair next spring and summer.	500.	
9	Poor	Remove sash east wall. Sash best beyond repair, glass replacement here would be a safety hazard. Suggest fiber glass.	Repair as soon as possible.	2000.	
11	Poor	Replace broken concrete on operating deck and repairs to miscellaneous steel.	Repair spring/summer of 1958.	750.	
14	Poor	Area around building too high. (Water flows into furnace room) Grade area for drainage.	Do work as soon as possible.	2500.	
17	Bad	Replace glass lights where missing or broken.	Replace before winter or as soon as possible.	200.	
			Total	$ 14450.	

Inspected by J. J. Tanner

Fig. 6. Regular building inspections can catch conditions before they are a serious problem; reports like this one help point up the necessity of corrective action.

For a preventive maintenance program to be doing a real job, it must be aggressive and continuous. Diverting preventive maintenance personnel from their assigned duties to improvement-type projects will lead to serious deterioration of a plant. Only under highly important or emergency conditions should such practice be permitted.

In planning for a preventive maintenance program the following items should be taken into account:

1. General management policy recommendations. 2. Plant production goals. 3. Seasonal weather conditions. 4. Recommendations of manufacturers. 5. Plant and equipment conditions and ages. 6. Commercial practices. 7. Experience.

Information used in carrying out preventive maintenance work is provided by service schedules. See Fig. 5. A good way to put a preventive maintenance program to work is by installing it in one production department at a time. Through this approach the reduction in emergencies in that department will make manpower available for use in other departments.

Even though scheduled inspection is a key requirement in the preventive maintenance program, some discretion must be used to prevent outlays of funds for more inspection than is actually required. For example, cost of inspection may exceed the cost of repair and downtime value. This can occur where major equipment has to be torn down for inspection.

Then, too, the normal life of the equipment may exceed manufacturing needs without the application of preventive maintenance. Also, PM may not be needed if standby equipment is available.

Preventive maintenance is certainly needed where equipment is critical to all or any part of the

manufacturing operations. Preventive maintenance is also needed if the state of repair of equipment influences the safety of working conditions.

Within the scope of preventive maintenance is the periodic overhaul of equipment. Service schedules are used to point out items that should be overhauled. Overhaul requires planning that should be sufficiently in advance of the scheduled work. In planning repairs it is well to consider the following:

1. Operators of equipment should be able to choose the time of overhaul, selecting a period when loss of product is the least critical.

2. The possibility of tying in the repair of other equipment during the "shut-down" for maintenance in order to attain minimum over-all downtime.

3. If design changes are necessary to improve equipment, adequate time should be allowed for this purpose.

4. Spare parts purchase and/or prefabrication.

5. Opportunity for the maintenance department to use craft skills in the best way with an allowance for adequate man-hours.

To have a dynamic preventive maintenance program it should be continually reviewed for possible improvements. Thought should be given to changing production conditions, availability of better materials, procedure improvement, and intervals between inspection and overhaul.

A good companion of preventive maintenance is its cousin, corrective maintenance. The latter embodies the determination of the needs for changing equipment design, production methods, and maintenance procedures leading to the reduction of maintenance costs.

To help the maintenance department focus on equipment that needs corrective action analytical aids such as the following are to be considered: 1. Inspection reports. 2. Special studies of repetitive failures. 3. Records of production downtime. 4. Equipment histories. 5. Cost studies. Leads can also be gotten for possible improvements by manufacturers' advertisements of new equipment developments.

Other factors that are worthy of consideration in a corrective maintenance approach are: new materials, operator training, craft training, merits of area and central control.

A well planned maintenance management program should be supported by a reasonably efficient work force. But to know the effectiveness of the available manpower there must be some reliable method of gaging it. In the plant incorporating the maintenance control features discussed in this article. Work Sampling or Ratio Delay studies are used for the purpose of measurement.

Work sampling is based on a law of probability which shows that a small number of observations taken at random tends to follow the same pattern of distribution as a large number. If the frequency of random observation is gradually increased, the study approaches the definition of continuous observation used in motion-time studies. Random sampling is in effect if one element of work has as good a chance as another to be observed at any one time.

In the application of random sampling to maintenance operations four categories are used in this particular plant: namely working, waiting (standing-by), traveling, and being idle. If a small number of ob-

Fig. 7. Equipment records are handy items to have around. In event of an emergency breakdown when parts are needed in a hurry, they can have the desired information. This type of form may be kept in a folder with other pertinent material.

MAINTENANCE DEPT. EQUIPMENT RECORD

DEPT. _____ BLDG. NO. _____ PROPERTY NO. _____ JOB & SHOP NO. _____

EQUIPMENT _____

MFG. BY _____ ACQUIRED DATE _____ W P NO. _____ ORDER NO. _____

DATA _____ SIZE _____ MODEL _____ SERIAL NO. _____

DRIVE _____

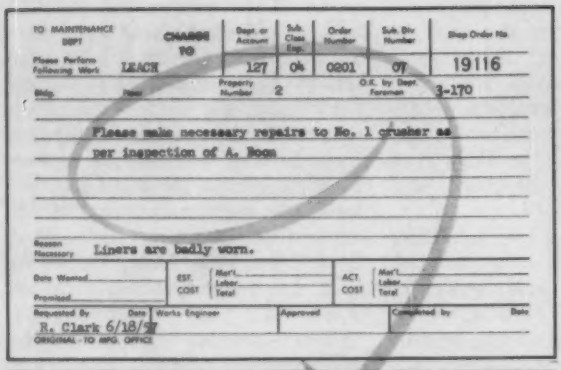
USE _____

LUBRICANTS USED _____

INSPECTION SCHEDULES _____

MOTOR DATA				STARTING EQUIP.	SPARE PARTS CARRIED		INDICATE BY OR BK	
AC'DC								
H. P.								
VOLTS								
PHASE								
AMPS								
R. P. M.								
MODEL								
TYPE								
FRAME								
SERIAL NO.								
MAKE								

REMARKS _____



TO MAINTENANCE DEPT — CHARGE TO

Dept. or Account	Sub. Class Exp.	Order Number	Sub. Div. Number	Shop Order No.
127	04	0201	07	19116

Please Perform Following Work: LEACH

Ship: Rec'd: Property Number: 2 O.K. by Dept. Foreman: 3-170

Please make necessary repairs to No. 1 crusher as per inspection of A. Boom

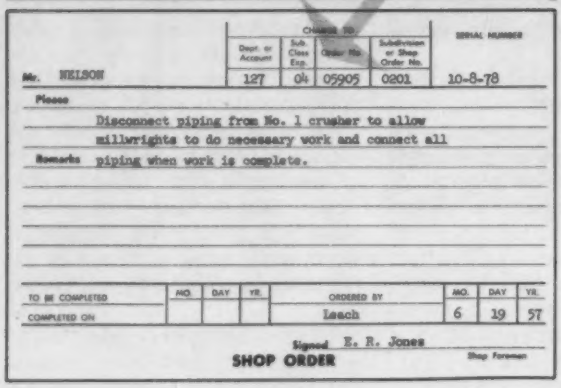
Reason Necessary: Liners are badly worn.

Date Wanted: Promised:

EST. COST: Mat'l. / Labor / Total — ACT. COST: Mat'l. / Labor / Total

Requested By: R. Clark 6/18/57 — Date — Works Engineer — Approved — Completed by — Date

ORIGINAL - TO SHOP OFFICE



CHARGE TO

Dept. or Account	Sub. Class Exp.	Order No.	Subdivision or Shop Order No.	SERIAL NUMBER
127	04	05905	0201	10-8-78

Mr. NELSON

Please

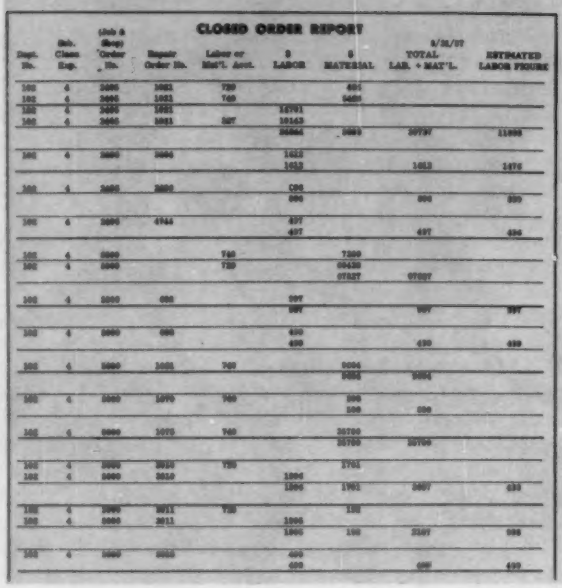
Disconnect piping from No. 1 crusher to allow millwrights to do necessary work and connect all piping when work is complete.

Remarks

TO BE COMPLETED	MO.	DAY	YR.	ORDERED BY	MO.	DAY	YR.
COMPLETED ON				Leach	6	19	57

Signed E. R. Jones — Shop Foreman

SHOP ORDER



CLOSED ORDER REPORT

Dept. No.	Sub. Class Exp.	Job & Shop Order No.	Repair Order No.	Labor or Mat'l. Acct.	$ LABOR	$ MATERIAL	6/30/57 TOTAL LAB. + MAT'L.	ESTIMATED LABOR HOURS
102	4	2680	1021	720		491		
102	4	2680	1021	740		5680		
102	4	2680	1021		16791			
102	4	2680	1021	527	10163			
					26954	6173	33127	11898
102	4	2680	2686		1653			
					1653		1653	1476
102	4	2680	2690		696			
					696		696	899
102	4	2680	4744		497			
					497		497	496
102	4	2680		740		7200		
102	4	2680		720		69430		
						76627	76627	
102	4	2680	688		597			
					597		597	597
102	4	2680	688		499			
					499		499	499
102	4	2680	2681	740		9264		
						9264	9264	
102	4	2680	1070	740		598		
						598	598	
102	4	2680	1075	740		25700		
						25700	25700	
102	4	2680	2010	720		1701		
102	4	2680	2010		1204			
					1204	1701	2907	633
102	4	2680	2011	720		198		
102	4	2680	2011		1906			
					1906	198	2104	998
102	4	2680	2010		499			
					499		499	499

Fig. 8. A craft foreman who gets a repair order may find that another craft must clear his way. So, he writes a shop order.

Fig. 9. Monthly Closed Order Report sample shows figures made available through electrical tabulating equipment use.

servations were made of these elements, ten for example, the percentage of error would probably be considerable. As the number of observations increases the percentage of error decreases.

In order for an observer to do a good job in the field he must have a clear interpretation or concept of the elements involved as well as sound judgement in unusual occurrences. He should know what is meant by working, standing-by, traveling and being idle.

To make a tally under the classification of "working" an observer must actually see the man or men actually engaged in such activities as installing, welding, setting-up, disassembling, and so on.

An observer should tally his observation under "standing-by" if the individual or individuals were, for example: at the storeroom or toolroom window; waiting for employees of another craft to complete their work; waiting for equipment availability; waiting between jobs for the foreman; attending a meeting; and receiving job instructions.

The traveling category even includes walking while on the job site. Of course, going between jobs is considered travelling. However, if the helper carries a tool box or material personally or by hand truck, the observation is recorded under the "working" classification.

Observations of idleness cover personnel in locking rooms, on all personal business, sitting, snacking, resting, gossiping, standing or being away from the job site for no obvious reason.

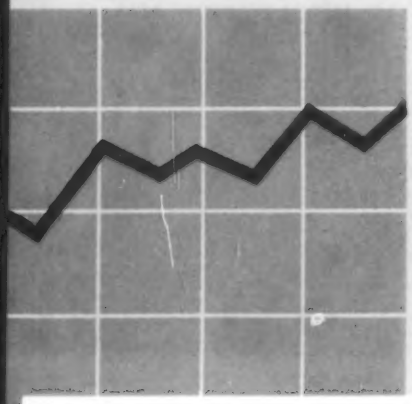
To determine the physical location where observations should be made, a lottery system is used to attain random selection. Schedules of maintenance activities in selected areas are consulted to find out where various jobs and individuals are located. However, no individual is spot-lighted in the observations.

Since work sampling is, in effect, a study of the efficiency of maintenance management, it is necessary that the resulting information be restricted to management personnel. It is also essential that an observer be selected for his honesty and knowledge of the plant and maintenance personnel. In his observations he must not show partiality to any group.

After maintenance management procedures have been installed in a plant and have been in use for a reasonable length of time, an evaluation is in order to see just how effective they have been. Ratings are given to such factors as inspection, job order system, equipment histories. Are they good, bad, or mediocre? What is the percentage of job scheduling, men being scheduled, job completion? At what percentage of their classification are craftsmen performing? What is the scheduling cycle?

Ratings do not indicate that top efficiency is being reached and/or proper timing of events is being attained. They are indicators, however, of the completeness of procedures.

Cost reports used in the maintenance management program should be examined and figures compared. See Fig. 9. End



OPEN SHELF FILING

Blueprints, Drawings Easy To Locate

By R. P. KENNEDY, Engineer, Plant Planning, Western Electric Company

MODERN MANUFACTURING methods require an ever-increasing number of blueprints, vandykes, reproduced drawings, reference books and associated paper work. For years, we have used filing cabinets for this work. Eventually the Plant Planning Engineer ends up attempting to mediate between the space requests by the operating organization and the insistence of other organizations, particularly manufacturing, that they cannot give up the space required. In all cases we are faced with three main factors in solving the problem:

1. The cost per square foot of the space used.
2. The cost of the equipment used, including installation expense.
3. The availability of the space.

Conversion to open shelf filing showed promise of improvement in each factor. In order to gain practical experience, we installed nine double sections of open shelf filing, requiring 67.5 sq ft of floor space. Our total installation cost was approximately $1250.

We removed the contents of 35 drawer files, occupying 105 sq ft, and stored the material in the open shelf files. The present cost of the 35 drawer cabinets would be about $5000.

Using 30 in. aisle spacing with the new equipment, we also saved six inches per aisle over that required with the cabinets. Although stabilizers are furnished, the installation gave the operating employees a feeling of instability. As a result, braces were used across the top.

Initially, we used the top and bottom shelves for storing our reference books and supplies. These two shelves are awkward for the average girl to work. The remaining shelves were employed for the storage of blueprints in manila folders, with the corners of the folders cut away for quick searching.

Within a few months, detailed observation demonstrated the following results:

1. An inventory of space can be quickly made by the supervisor in charge.
2. Filing operations are 30 per cent faster.
3. Selecting is 25 per cent faster.
4. Untidiness is much more evident.
5. The open shelf system is much less tiring to employees.
6. Alphabetical, numerical and subject filing methods may be used. However, case files arranged by name or number sequences are the types more readily adaptable for open shelf filing.

By changing over to open shelf filing, we were able to save on floor space. In addition, filing operations are 30 per cent faster, and selecting the material is 25 per cent faster.

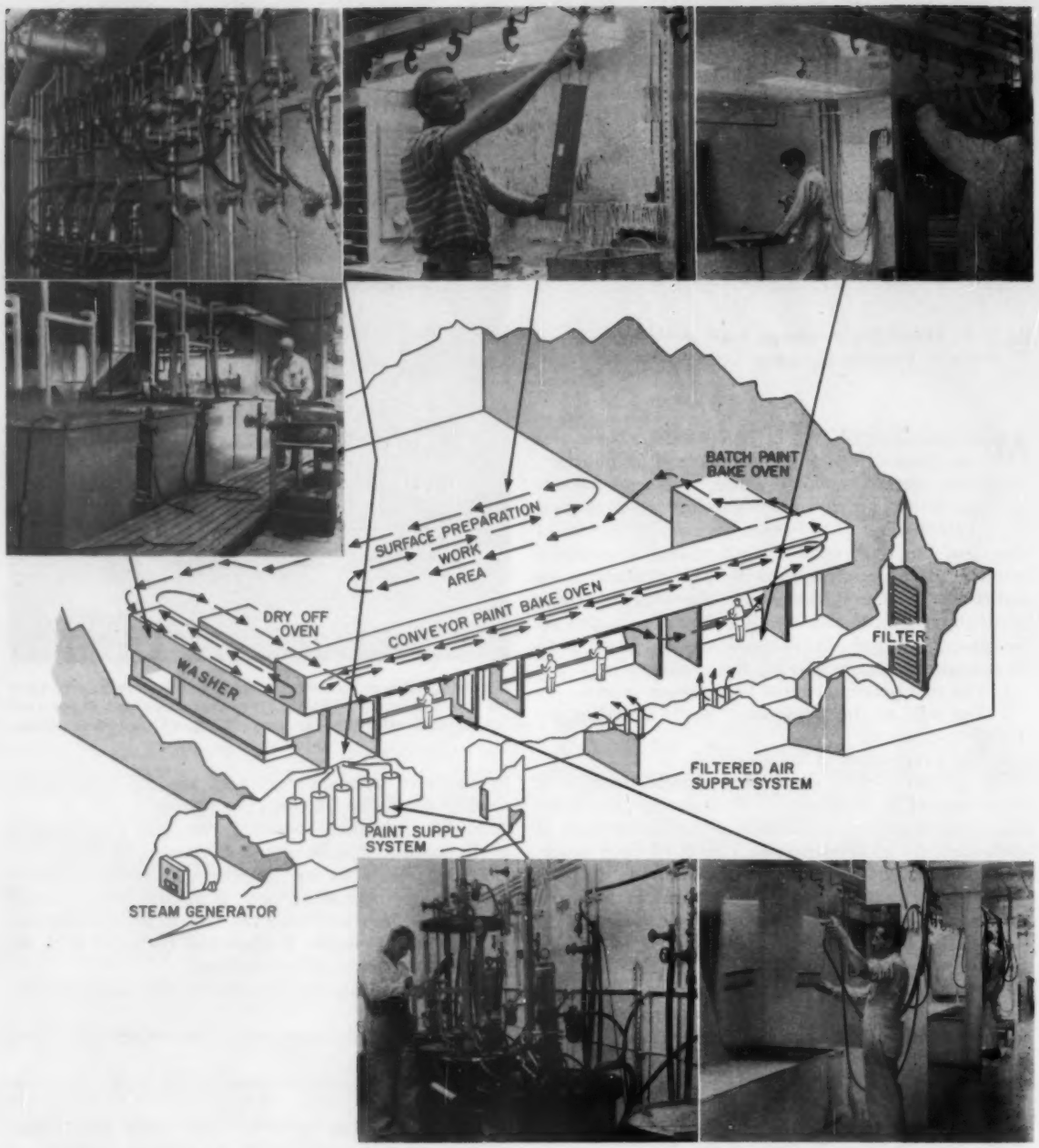
Along with these benefits, we also experienced some possible disadvantages to open shelf filing.

1. Dust—it does not present a problem in active files. A good cleaning once a month with a small vacuum cleaner will keep the files in good condition.
2. Security—none. If classified material is to be stored, the area must be enclosed.
3. Fire hazards—approximately the same as with cabinets.
4. Sprinkler damage—more potential with open files.
5. Appearance—untidiness in cabinets is not evident.
6. Floor loading—greater with open files, since each shelf will support 150 lb without sagging.
7. Mobility—the cost of disassembling and reassembling open files will be considerably more than moving cabinets.
8. Availability—the use of the upper shelves presents a minor problem. We use a small safety step ladder with a 42-in.-high T wagon for filing and selecting. With these, results are very satisfactory.

Since the original installation, we have two other installations in use, each for a different type of work.

One is in our engineering print files. Here, we are storing folded prints and vandykes using dividers only, without manila folders.

The second is in our publications group. Here, operators use shelves to sort and collate printed sheets from the multilith machine. **End**



Paint Shop Bottleneck Uncorked

Conveyorized Operations in "White Room"

THE GROWTH in ten years of Ampex Corporation, Redwood City, California, from a small group of men to an 1800-man organization has brought its share of production problems. Ampex people work in scattered buildings, some new, some acquired, producing magnetic tape recording equipment. Until last year the paint shop was among the major bottlenecks. This department, occupying some 4500 sq ft, was manned by three shifts totaling 100 employees.

It had four principal drawbacks: 1. growth and progress had rendered facilities obsolescent; 2. pro-

duction volume urgently underlined the need for expansion; 3. major inefficiencies were becoming apparent after operating the department for a number of years; and 4. most important of all, there was difficulty in obtaining the desired finish quality.

Formerly, for example, a cabinet door had to be painted a number of times to get the desired results. The paint would sometimes pile up so thickly it was necessary to remove it and start over again. Now quality is achieved in a single cycle through the specified sequence of operations.

Secondly, the productivity of the department has been increased two or three times. Far more work is being turned out with a smaller force working only one shift. Personnel work under more pleasant and efficient conditions. Production goes on uninterruptedly. Operational savings approaching 10 per cent of the cost of product finishing are being realized, as compared to the cost of the former system.

New Shop Is Twice as Big

The new shop occupies 9000 sq ft, double the size of the old one. Work is completely conveyorized. A continuous 60-ft chain, operating at varying levels, is equipped with hooks on 12-inch centers.

While the operation is considered ideal for straight line, high production runs, it is flexible enough to accommodate the expanded job shop setup which best describes the company's paint finishing operation.

The average run through the department is 50 units, although it may range from one to 500 units. Unit size ranges from one-half-inch by three-inch flat metal to 36-in. by 20-in. by 3-in. pieces.

Materials finished include fabricated aluminum and steel parts; aluminum, die-and sand-castings; machine-turned and formed parts, and welded assemblies.

Up to seven paint spraying stations can be operated simultaneously, fed by five heated paint distribution systems.

The high degree of flexibility engineered into the system provides utmost control over the time and temperature of baking and other cycles.

The sequence through the department begins in the preparation area. After a series of inspections, parts are hung on the line and normally proceed through the following processes: 1. zinc phosphate coating; 2. dry off; 3. cooling; 4. prime painting; 5. surface coating; 6. baking; 7. finish coating; 8. baking; 9. surface preparation; 10. finish coating; 11. baking; 12. inspection; 13. silk screening; 14. wrapping; and 15. delivery to live storage.

Bulk of the incoming parts pass through a five-stage power washer where they are washed, rinsed, zinc - phosphate - coated, rinsed again and fixed. Temperature range in the washer is 140-190 F.

The washer is adjacent to the plating and cleaning section, which consists of seven 3-ft by 3-ft by 4-ft tanks maintained at 100-190 F. Processes carried out at this stage include pre-cleaning parts for heliarc welding, and application of a chemical film coating.

After making a loop through the power washer, parts make a single pass through the drying oven, typically at 180 F for five minutes. Then, in order to reduce temperatures to optimum spraying heat, they travel through a cooling loop for 10 minutes.

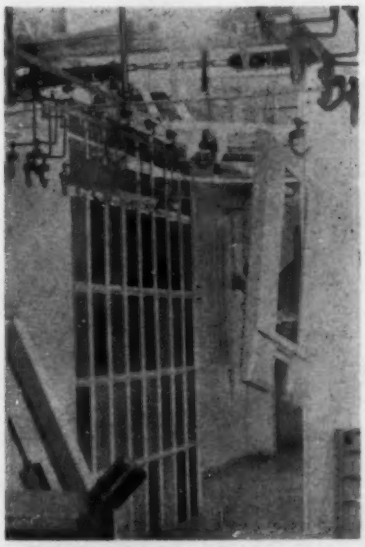


Fig. 1. Double bank filters assure constant flow of dustless air in spray room.

When the parts arrive at the first two-man spray booth for surfacing, they are sprayed either with zinc chromate or surfacing primer. Metal temperatures at this point are 130-135 F. Between this booth and the next station there is a two-minute flash-off period. Finish is applied at a three-man 18-ft spray station.

From Painting to Oven to —

In the normal run of production, parts continue on the conveyor line after painting, and swing up into the main drying oven, which measures 8 ft by 8 ft by 100 ft. The conveyor makes a loop at the far end of the oven, so that there is a two-way run totaling 200 ft, and lasting 40 minutes.

Three inches of insulation around the oven insure holding temperatures to within plus or minus two degrees. Oven temperatures up to the 350 F range are remotely controlled in the main oven by recording-type temperature controllers. Usual heat level is 275 F.

Parts are re-inspected on the conveyor at the end of the drying period, passed to the wet sanding tables if the cycle is incomplete, or transferred to the silk-screening section if the final finish has been applied.

The cycle differs for parts that require special finishing, such as the application of a customer's own paint. It is the same up to the point where parts leave the surfacing booth, but then they bypass the finishing booth and proceed to a 14-ft, two-man batch booth. Painters at this station work from either the conveyor or carts.

Next to the batch booth is an 8-ft by 8-ft by 24-ft gas-heated batch oven normally maintained at 250-300 F. The oven has doors at both ends, so that batch carts can be loaded on the finishing side and unloaded in the wet sanding-preparation area. The floor of the batch oven is equipped with rails for easy removal of batch carts without the need for workmen to enter the oven.

Occasionally masking is necessary on multicolor and special parts. These are painted on the

conveyor line up to the point of masking, then masked and handled through the batch booth.

Four major colors and one standby color are used in routine production. Zinc chromate primer, surface primer and enamel are the finishing materials. They are preformulated by the vendor so that no in-plant processing of finishes is required.

Material is pumped directly to spray stations from 50-gal drums in the paint supply room. Paint formulation is based on a spray temperature of 180 F, maintained by a circulatory hot water system working through individual spray stations. Specially constructed delivery hoses distribute paint from heat exchangers to stations. (Hot water from the exchangers is pumped to and from the guns parallel to supply lines to maintain the temperature.)

Paint supply lines are constructed of half-inch black iron tubing with all bends and turns formed to assure a clean, even flow of material. Thinners for washing lines are pumped separately to all spray stations, each of which is equipped with a water curtain.

The paint distribution system, blowers and other components of the department are powered by 34 electric motors ranging from one-half to 30 hp, with a total of 100 hp.

Facts About Power Conveyor

The overhead power conveyor has a speed range of from 4 fpm to 12 fpm, but it is normally operated at 5 fpm. In an emergency the entire system can be shut down from any one of five strategically placed conveyor stops, or from conveniently located stop stations.

Safety has been a prime consideration. The entire 9000 sq ft area is surrounded by a one-hour fire wall and protected by sprinklers, emergency blankets and extinguishers of both the CO_2 and dry chemical types. Materials are retained in approved safety containers.

Individual electric motors are equipped with lockout switches. All motors are controlled from a single master panel in which is located all contactors and starters. Electrical distribution from the panel throughout the main finishing room is accomplished via overhead distribution gutters and branches.

To maintain cleanliness in the spray room all operating gear, paint pots, regulators, heat exchangers and valves are located outside the "clean room." The interior of the room has been painted with three coats of white gloss enamel and the floor is covered with vinyl tile.

The main painting area is conditioned and pressurized with one-eighth-inch water column above atmosphere of filtered air. This makeup air—60,000 cfm—is maintained at 72 F. Air is filtered on both the intake and discharge sides of blowers to eliminate most of the airborne dust and dirt. About 45,000 cfm is exhausted through spray booths and other openings.

The new installation represents a conversion from gas to steam heating to improve regulation as well as to reduce noise and dirt problems. Steam is produced by a 100 hp gas-fired Scotch boiler remote from the finishing department. The system requires sufficient natural gas to provide approximately 5,000,000 Btu per hour for bake ovens, steam and for heating incoming air.

Planning the department was carried out in meetings of operating personnel, the process engineering staff and the equipment and facilities group. Over-all engineering and job supervision of plumbing, electrical, mechanical, steam, carpentry and sheet metal installation were the entire responsibility of the plant layout department. The installation was thus achieved at a figure 20 per cent lower than if it had been purchased as a package. **End**

Fig. 2. If cycle is incomplete, parts are sent to the wet sanding tables.

Fig. 3. When necessary, parts are removed from conveyor, to dry sanding station.

BONUS PAY FOR MAINTENANCE
Forms, Standards Help Make It Possible

By STEPHEN C. HAMLIN, Management Services Div., Ernst & Ernst
WILLARD P. SCHNEIBLE, Chief Industrial Engineer, Rome Cable Corporation

"WHAT? STANDARDS and incentives in our Maintenance Department? Never! It can't be done!"

These were the general, and perhaps understandable sentiments of many at the time when Rome Cable Corporation's top management made the decision to put indirect departments, including maintenance, on a par with production workers, so that they too could be rewarded for increased productivity in their departments.

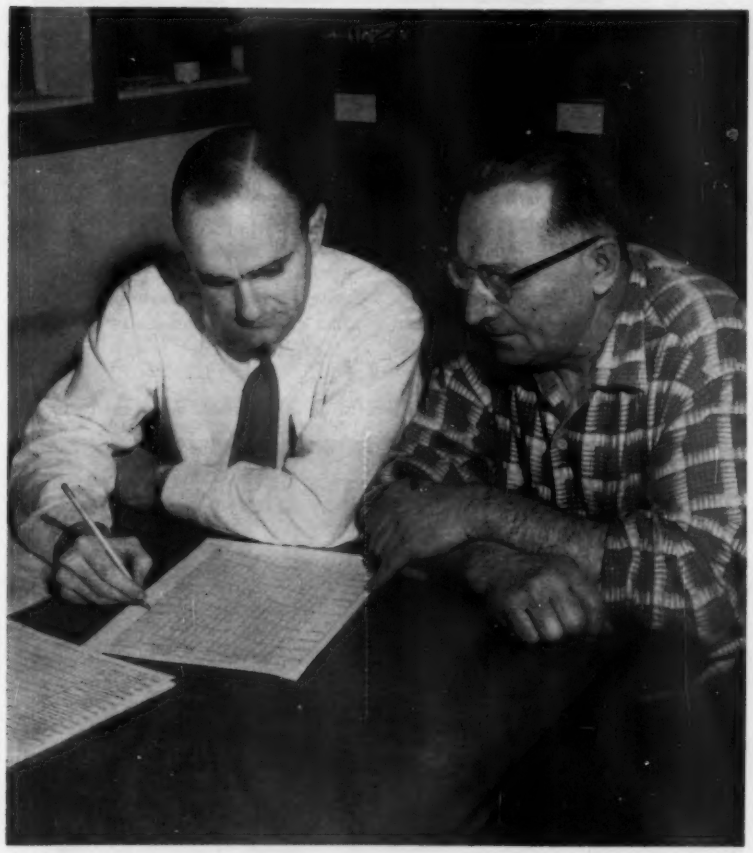
Basic objectives of this program were:

1. Enable indirect employees to earn an incentive which heretofore was confined to the direct labor force.

2. More efficiently utilize the indirect labor force by setting up Earned Hour Control Reports, measuring backlog of work and planning the work in advance for each employee.

3. Keep the downtime on machines, due to mechanical failure, to a minimum through a well-planned preventive maintenance program.

Fig. 1. An earned hour control report viewed by an engineer and craft foreman.



Rapid company growth was an added factor stressing the importance of keeping maintenance methods and procedures in pace with the rapidly expanding program.

To exemplify this growth, the company, in floor area alone, has increased almost 10 times the floor area it had in 1936. In 1936, production was begun with the manufacture of basic products such as hot-rolled copper rods, bare and tinned copper wire, magnet wire, weatherproof wire and plain rubber insulated wire.

Today, Rome Cable produces virtually tens of thousands of different sizes and varieties of wire and cable. They range from wires finer than a human hair to cables larger than a man's wrist—from standard building wire to complex control cables used in giant electronic computers.

A maintenance department obviously spending over twenty years keeping up with such rapid plant expansion, had little time to spend developing improved planning and control methods, to say nothing of tackling single-handed the formidable task of setting time standards on work of such a variable nature.

To tackle this problem, management set up a team consisting of its chief industrial engineer, a maintenance industrial engineer, the master mechanic, and a repre-

sentative from the firm of Ernst & Ernst.

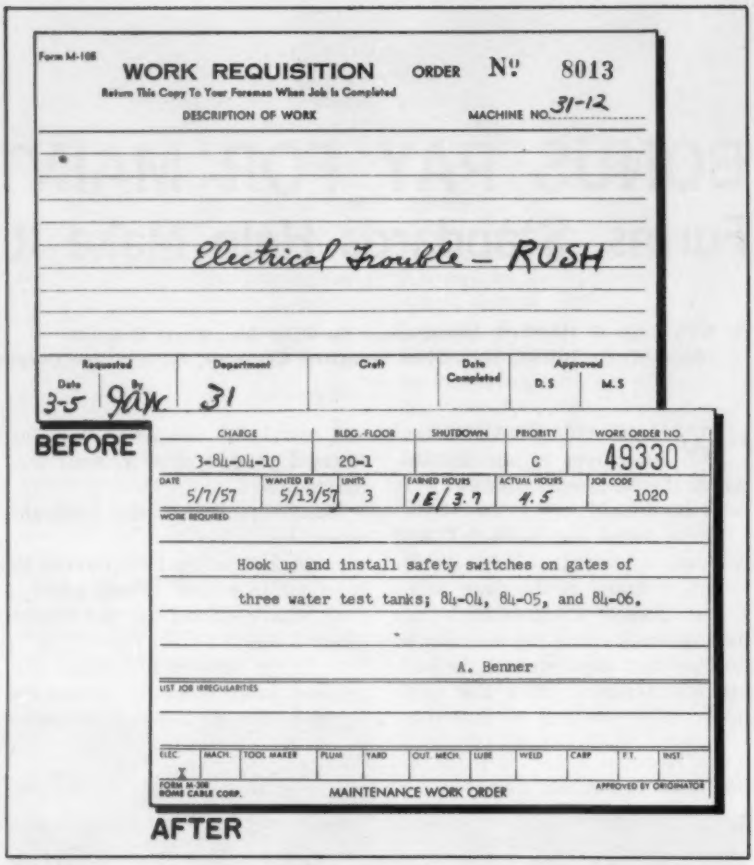
Maintenance program. The steps taken in setting up the maintenance program are as follows:

1. Study present organization and determine additional organization requirements to administer and operate maintenance standards program.
2. Set up work order system for requesting and authorizing the work.
3. Establish system of charge numbers and job codes to be assigned to the work orders for cost purposes and for use in application of the standards.
4. Classify maintenance work into four categories: a. Routine. b. Repetitive. c. Non-repetitive. d. Estimated.
5. Analyze at least six months of work orders and set standards through historical data. Level standards (historical) by a thorough work-sampling study.
6. Create method for man-assigning and planning the work of all maintenance personnel at least one day in advance.

Organization. The existing organization was headed by a master mechanic, supported by a clerk-typist, an assistant master mechanic, various craft foremen and stock clerks. The total maintenance crew numbered 174.

It was apparent from the start that this organization would need a slight overhaul and possible face lifting in order to bring about improvements. For example, there was no estimator. All estimates which, incidentally, covered a continuing and substantial capital improvement program, were performed by the plant engineer and the master mechanic. This involved both of these key people in considerable detail at the expense of other important duties. Further, these estimates were in dollars, with a minimum of supporting detail.

Maintenance foremen in some cases were spread too thin. In one case a foreman supervised nearly 50 outside mechanics. As a result, many area mechanics were informally assigned to and working under the direction of the operating personnel, sometimes even



Form M-108
WORK REQUISITION ORDER No. 8013
Return This Copy To Your Foreman When Job Is Completed
DESCRIPTION OF WORK MACHINE NO. 31-12

Electrical Trouble – RUSH

Requested Date	By	Department	Craft	Date Completed	Approved D.S	M.S
3-5	JAW	31				

BEFORE

CHARGE	BLDG.-FLOOR	SHUTDOWN	PRIORITY	WORK ORDER NO.
3-84-04-10	20-1		C	49330

DATE	WANTED BY	UNITS	EARNED HOURS	ACTUAL HOURS	JOB CODE
5/7/57	5/13/57	3	1E/3.7	4.5	1020

WORK REQUIRED

Hook up and install safety switches on gates of three water test tanks; 84-04, 84-05, and 84-06.

A. Benner

LIST JOB IRREGULARITIES

ELEC.	MACH.	TOOL MAKER	PLUM.	YARD	OUT. MECH.	LUBE	WELD	CARP	F.T.	INST.
X										

FORM M-308 ROME CABLE CORP. MAINTENANCE WORK ORDER APPROVED BY ORIGINATOR

AFTER

Fig. 2. Work order forms now call for more details, typified by lower example.

under the direction of operating department machine operators; not supervisory personnel.

Timekeeping detail was generally inadequate for any kind of formal plans or controls.

Accordingly, the committee recommended a revised organization which increased the supervisory and clerical group by adding the following:

1. An estimator whose basic duties are to estimate in man-hours by craft all of the non-repetitive type jobs; plan all of the large jobs; coordinate multi-craft jobs; develop man-hour data.
2. Work order clerk who re-

Fig. 3. A board with clips permits placement of work orders under men's names.

ceives and properly prepares the necessary work orders for all of the requested maintenance services.

3. One additional foreman for the outside mechanics' craft. The activities of this group were spread over the entire plant area. It was physically impossible for one foreman of this trade to adequately supervise the activities of the people working under his jurisdiction.

Next, detailed movement of paper studies were made covering the work order and timekeeping procedures. Even though it was generally felt that these procedures fulfilled barely the minimum accounting requirements, Rome Cable management insisted that all changes be brought about with the least possible disruption to existing departmental activity.

The study revealed that under the old system, pads of work requisition blanks were distributed throughout the plant. Almost anyone wishing the services of the maintenance department would prepare and either mail or hand-carry the work requisition to the maintenance department office. In the case of urgent jobs, the originator would call either the craft foreman of the craft involved, or the master mechanic. In these instances, the request would be oral and whoever was receiving the call would have to prepare the work requisition. Here again, high level people were involved in too much clerical detail.

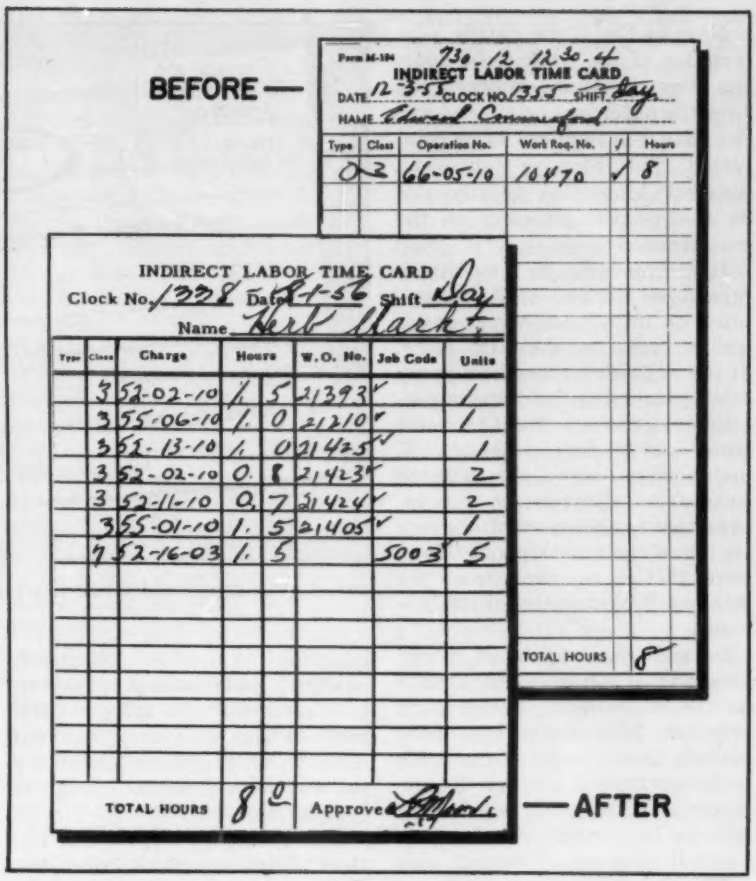
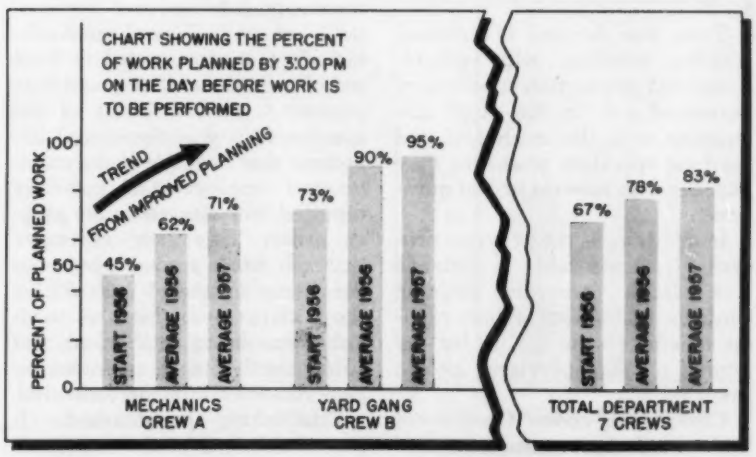

BEFORE —
Form M-104 730-12-1230-4
INDIRECT LABOR TIME CARD
DATE 12-3-55 CLOCK NO. 1355 SHIFT Day
NAME Edward Concannon
Type | Class | Operation No. | Work Req. No. | ✓ | Hours
0 2 | 66-05-10 | 10470 | ✓ | 8
INDIRECT LABOR TIME CARD
Clock No. 1338 Date 12-1-55 Shift Day
Name Herb Markt
Type | Class | Charge | Hours | W.O. No. | Job Code | Units
3 | 52-02-10 | 1/ | 5 | 21393 | | 1
3 | 55-06-10 | 1. | 0 | 21210 | | 1
3 | 52-13-10 | 1. | 0 | 21425 | | 1
3 | 52-02-10 | 0. | 8 | 21423 | | 2
3 | 52-11-10 | 0. | 7 | 21424 | | 2
3 | 55-01-10 | 1. | 5 | 21405 | | 1
7 | 52-16-03 | 1. | 5 | | 5003 | 5
TOTAL HOURS 8
TOTAL HOURS 8
Approved
— AFTER

Fig. 4. The lower indirect labor time card sample indicates closer accounting.

ble. RUSH!" gave the electrician little to go on. See Fig. 2. He had no clues as to special tools or special parts which he might take along with him and perhaps save a trip back to the shop later. He knew only the department and machine number. This type of information did little to encourage the electrician to report his time in any more than the broadest of detail. Charges were generalized, relatively little detailed information was available, and finally any control based on such information was difficult to make effective.

Formalized procedures. In order to bring about improved maintenance controls, formalized work order and timekeeping procedures were developed. This involved a new work order form, more detailed timekeeping methods, and expansion of the existing account code. The latter was required for purposes of developing a more accurate and concise accounting distribution of both maintenance labor and maintenance materials. Around these requirements a complete movement of papers was set up. The pre-numbered work order was to be issued in four parts.

Fig. 5. With better control methods percentage of work planned moved up.



Note in Fig. 2 the detailed description of the work to be done, the time allowance between the time the order was originated and the time it is required to be completed. This advance notice and detailed description greatly aids in the proper planning of the maintenance work.

It is important to note that a formalized work order of this type must be introduced with considerable care. In the first place, at Rome Cable's plant, and many other plants, the operating supervisors are prone to want to direct their maintenance activities. If maintenance crews are assigned to them on a permanent or semi-permanent basis, so much the better, from their standpoint! However, this is not true from the standpoint of economical maintenance.

In addition, originators of orders find it easier to generalize on the description of the work required. This allows them more latitude in the scope of the work to be performed, but at the expense of other work which may well be of greater importance to over-all company operations.

Therefore, the production man finds it much simpler to have a craftsman "handy." It is difficult to convince him that "fewer" craftsmen can do a better job.

The formalized work order procedure must be sold to the operating supervisor on the basis that even though it appears that he is being inconvenienced at the outset, the resulting improvements in improved planning, accounting, timekeeping and standards will pay him tenfold in a relatively short time.

Actual examples serve to stress these points. Compare the old work order with the new, the old time card with the new. See Figs. 2 and 4 respectively. Note the lack of information under the old method as compared with the complete advanced information relative to the job on the new forms.

This comparison alone proved a strong selling point with the Rome Cable supervisory personnel. The maintenance personnel too, built up increased enthusiasm as they observed how these simple methods could be used to look ahead, how they could make preparations in advance for tools and materials and how ultimately they could cut down on interruptions, and once a job was started, see it through to completion.

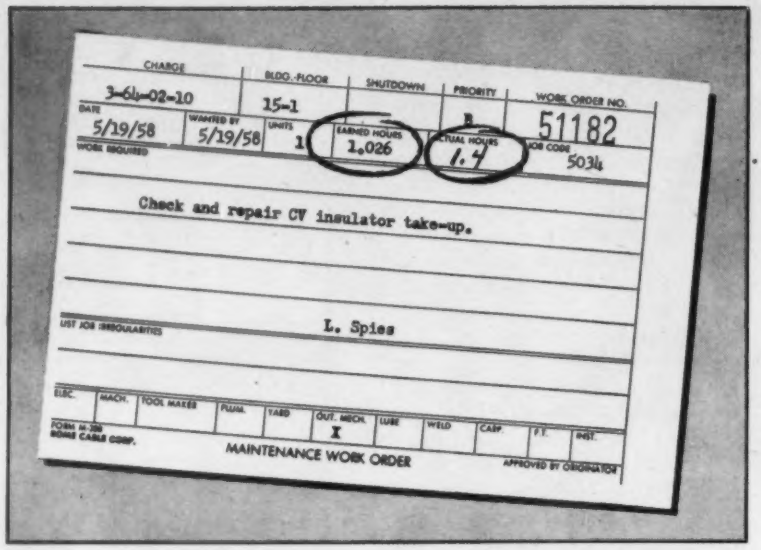


Fig. 6. The earned and actual hours shown above are explained in the text.

Introducing the work order. The start of the new work order procedure was a critical phase of the program. It was vitally important that all personnel, both maintenance and production, know exactly what was required of them in implementing the revised procedures.

For this purpose charts were prepared, backed up with step-by-step written procedures covering such areas as work under preparation, man-assignment, estimating, timekeeping, and so forth.

Time was devoted to informal training meetings with maintenance and production supervisory personnel and "in the shop" discussions with the mechanics and machine operators whenever they expressed an interest or had questions.

In addition, as the program progressed, considerable importance was placed upon the training function to the extent that regular meetings were set up for the benefit of all supervisory people involved.

Charges and codes. Concurrent with the foregoing steps, it was necessary to make minor changes to the existing account charges and add codes for identification of the various categories and classes of work for which the controls were established. This required the addition of only two items, namely type of work and job code number.

Type of work code identifies the labor and material job costs into one of the following types:

1. Equipment Repairs. 2. Building and Facility Repairs. 3. Yard Work. 4. Capitalized Jobs. 5. Expensed Jobs. 6. Safety Items. 7. Scheduled Preventive Maintenance.

Job code numbers identify the specific job and are used to apply the labor standard to the task.

Once the work order and the timekeeping procedures were established man-hour accumulations by job were posted to work orders and it was then possible to proceed with the setting of the standards. It was considered important that the time of the maintenance employees be correctly reported and charged to the proper order. This gave assurance that the work accomplished was accurately measured both during the initial period when the standards were being established, and subsequently, when maintenance performance would be measured.

Establishing the standards. It was decided that the standards

would be set up on the basis of careful analysis of historical data which would be developed over a base period of 30 weeks. During this base period, emphasis was placed on training, preparing of work orders, improving the time-keeping and any other areas having any bearing on the ultimate accuracy of the standards to be set.

Thirty weeks of work orders were collected and posted to standard sheets, for each job code. To illustrate how a standard was developed and applied, let's take one particular job, i.e. Check & Repair Take Up or Spooler, Job Code 5034. After thirty weeks of data was collected for this job code, an average time was obtained for each week by dividing the actual hours by the number of units reported. This average time per week was then plotted to a bar chart. By noting the distribution of time on this chart, it was possible to determine the validity of the various time values, and discard those which appeared to be out of line. We then obtained our standard by merely dividing the 30 week total actual hours by the total number of units. In the case of Job Code 5034 this was 614.0 actual hours and 395 units, which gave us a standard of 1.554 hrs/unit.

To further refine this standard we took a work sampling survey which showed us the level of activity for each craft. For the mechanics this was 66.0 per cent. This work observation took into account actual work on the job at a normal pace, travel time, and getting material or instructions from the foreman. All other time was considered idle time. This level factor was then applied to each standard accordingly. In the case of Job Code 5034, 1.554 hrs/unit is multiplied by 66.0 per cent to arrive at the final standard of 1.026 hrs/unit.

An example of how this standard works is shown on the accompanying work order. See Fig. 6. The work order is made out to repair the take-up on a certain machine. All the necessary information is typed on the order along with the standard of 1.026 hrs/unit which appears in the Earned Hours box. On this particular job the work was completed in 1.4 hrs which appears in the Actual Hours box. Since one unit of work was completed, the earned hours for this job is one unit times the standard of 1.026 hrs/unit. Rounding off to the nearest tenth of an hour this in turn gives us 1.0 Earned Hours. Therefore the per cent performance for this particular job is 71.5 per cent (1.0 Earned Hours divided by 1.4 Actual Hours).

Now, if we can assume that all of the craftsman's other jobs were performed in a similar manner, he would attain this performance for the day. This per cent performance is then converted to a bonus percentage based upon the Rome Cable pay plan.

This step, that is, the leveling of the historical standards through use of work sampling techniques did much to improve the accuracy of the standards.

At present the bonus is calculated weekly but is based on the performance for the prior ten-week period (ten week moving average). One bonus per cent is paid to all maintenance personnel and it is based on the performance of the maintenance department as a whole.

To facilitate establishing the standards, the maintenance work was classified into four job categories:

1. Routine jobs. This class of work covers two common types of maintenance work which normally do not require a written order. The first covers such work as: storekeeping, attending union meetings, taking inventory, and so forth.

The other type deals with maintenance jobs of a minor routine and repair nature which recur at frequent intervals and are of short duration. Examples are: replacing light bulbs, motor inspecting, and routine oiling.

To set the standards for this type of work the actual hours each week were posted on a summary sheet. At the end of the 30-week base period, the average hours per day, per week, or per unit were computed, and leveled according to work sampling studies. The result became the standard for that job.

2. Repetitive jobs. In this class a job repeats at less frequent intervals, perhaps once a month, but the job content is the same or similar. Work orders for these jobs were accumulated and classified by types and crafts. At the end of the base period, the total actual hours expended on each job were computed, the average time per job determined, leveling factors applied, and the result became the standard.

It was important to screen carefully all repetitive jobs and where actual hours were excessive, the job was transferred to the non-repetitive group. This was done to exclude jobs of an unusual nature from the established repetitive category.

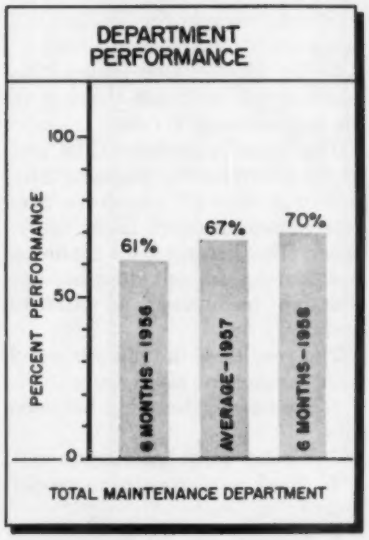
Work summary sheets were prepared and the standards set in a similar manner described for the routine jobs.

3. Non-repetitive jobs. As the name implies, this class of work covers orders that do not recur. Therefore, they were divided into time categories as follows: 0 to 8, 8 to 16, 16 to 32, 32 to 64 hr, etc.

These jobs were accumulated during the base period, the average time per job was computed for each time classification, which, after leveling, became the standard.

Estimated jobs. These jobs were associated with all orders in excess of 64 hr and were usually capital projects, new work, rearrangements, or major repairs.

Fig. 7. In the plan per cent performance is converted to bonus percentage.



Estimated jobs were broken down into detailed estimated elements of work performance. These are now prepared by the estimator who assigns the work to crews set aside for this specific type of work.

For measurement purposes, the estimate, once approved by the master mechanic, becomes the standard.

Earned hour report. Once the standards were developed, earned hour reports were prepared for each craft within the maintenance department and summarized for the department as a whole. A sample of this report is shown in Fig. 8. The purpose of these earned hour reports was to provide a measure of: 1. Craft performance. 2. Department performance.

In addition the reports were used to: 1. Provide a basis for payment of incentive wages. 2. Identify weak areas where additional supervisory assistance was required.

In the meantime, while the standards were being established, other important improvement steps were taking place.

Planning and man assignment. Due to the previous informal methods of control, it was extremely difficult to plan ahead with any degree of accuracy. Orders were issued informally, a good deal of the work requests were on a "crash" basis and in general, the existing "planning tools" available to the master mechanic and craft foremen required that they spend most of their time chasing the crews, as spread out as they were. Not enough time was spent in looking ahead.

In fact, this was a common complaint of the master mechanic and his foremen. They welcomed the possibility of refinements which would allow them to do a better job of planning the work ahead of their crews.

Adding the work order clerk to the department relieved the foremen of a substantial paper work burden. In addition, with orders funneling through one individual, they are kept uniform. Work descriptions are more complete and accurate and charges are more correct. Certain advance preparation can be made automatically without sending craftsmen out on preliminary investigation.

MAINTENANCE DIV. – EARNED HOUR CONTROL REPORT – WEEK END. Jan. 15

CRAFT	CLASSIFICATION OF JOBS	10 WEEK MOVING AVERAGE		
		EARNED HOURS	ACTUAL HOURS	PERCENT
ELECTRICIANS	ROUTINE	139	110	126
	REPETITIVE	297	223	133
	NON-REPETITIVE	263	202	130
	ESTIMATED	490	366	134
	TOTAL	1189	901	132
TOTAL MAINTENANCE DIVISION	ROUTINE	1868	1448	129
	REPETITIVE	1686	1277	132
	NON-REPETITIVE	1231	962	128
	ESTIMATED	2192	1673	131
	TOTAL	6977	5360	130

Fig. 8. Earned hour control reports presented numerical gages of performance.

Objectives of planning and man-assignment were:

1. To provide each maintenance group with a planning board to be used by foremen in assigning work to the craftsmen.

2. To assure that, to the highest degree possible, at least one full day's work is laid out for each craftsman on the day prior to the day the work is to be performed, i.e. tomorrow's work is planned today, allowing for adequate tool, parts, and other job preparation.

3. To translate work called for on work orders into terms of standard man-hours, number of mechanics required, and elapsed time.

4. To provide the foreman with a simple means for following progress of jobs to completion.

5. To develop load information necessary to evaluate the size of the maintenance crews.

The basic requirements of any sound maintenance planning procedure is that all jobs have predetermined standard times established. This being so, the planning and man-assignment steps become effective on almost a routine basis.

The results of the planning and man assignment steps were:

1. Reduced time spent between jobs.

2. Fewer work interruptions.

3. Work performance in proper priority sequence.

4. Quality of work improvement through fewer interruptions.

5. Better employee morale.

The per cent of planned work charts indicate the effects of the improved planning. The charts show, by crafts, the per cent of work completed on a planned basis. Planned work consists of work orders placed on the planning board by 3:00 P.M. on the day before the work is scheduled to be performed.

From the program outlined, Rome Cable has been able to accomplish the following:

1. Establish an economical and practical standards system from which a bonus may be paid.

2. Establish an adequate system of controls for evaluating the effectiveness of the maintenance department.

3. Institute a formalized preventive maintenance program.

4. Greatly improve the utilization of man power. **End**

Fig. 9. Addition of a work order clerk has diminished supervisor's paperwork.

STEAM TRAP SELECTION CHART

5. Determining Condensate Formed In Air-Heating Coils

By WM. G. STEINMILLER, Research Engineer, Yarnall-Waring Co., Chestnut Hill, Philadelphia

AIR HEATING coils are widely used through industry to raise the temperature of air for process work and comfort heating. The accompanying chart permits easy calculation of the condensate formed when heating air through a specified temperature range. Factors you must know to use this chart are the heat transfer rate (Btu per hr per sq ft per deg F) heat transfer area, difference between the air and steam temperature at the start of heating, and the steam pressure.

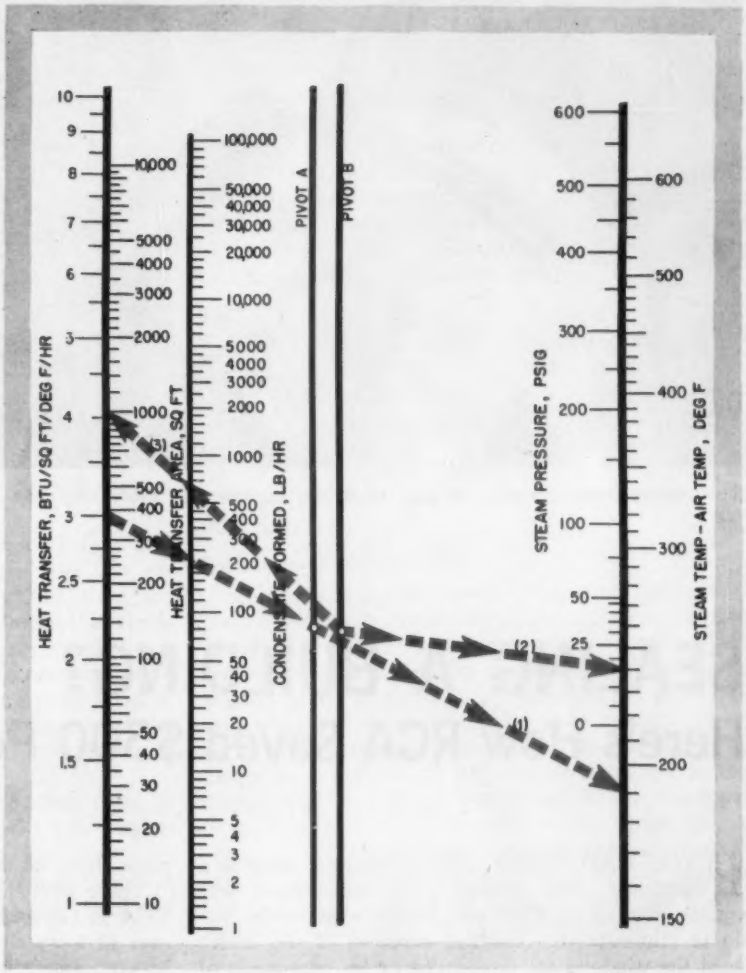
Example: What is the condensate load in an air heating coil having an area of 1000 sq ft if the heat transfer rate is 3 Btu per hr per sq ft per deg F, and the steam pressure is 15 psig saturated? Air enters the heater at 60 per deg F.

Solution: The difference between the steam and air temperature is 250-60=190 per deg F. Enter the chart on the left at the heat transfer rate of 3 Btu per hr per sq ft per deg F and project to the right to the difference between the steam and air temperature, 190 F. From the intersection of this line with Pivot A draw a line through the steam pressure of 15 psig on the right. Then from the intersection of the latter line with pivot B draw a line to the heat transfer area calibration, of 1000 sq ft on the left. At the intersection with the condensate scale read the condensate load as 605 lb per hr, closely.

As drawn, the chart presents results that are valid for still air, and is based on the relation: C=AH(T-t)/L, in which C=condensate formed, lb per hour; A=heating area of the coil, sq ft; H=heat transfer rate, Btu per hr per sq ft per deg F; T-t=steam temperature minus entering air temperature, deg F; L=latent heat of the heating steam, Btu per lb.

The heat transfer rate for coils used in still air varies from about 2 to 8 Btu per hr per sq ft per deg F, based on the initial temperature of the air, the steam pressure, cleanliness of the coil, and other factors. For steam pressures to 25 psig and entering air temperatures to 75 F the heat transfer is usually in the range of 3 Btu per hr per sq ft per deg F. Between 25 and 300 psig and the same air temperatures the rate is about 4 Btu per hr per sq ft per deg F. Above this pressure the rate rises to 5 or more.

An exact solution of preceding problem gives a condensate load of 604 lb per hr. If you study the chart closely you will see that the solution line indicates slightly more than 600 lb per hr, but to attempt to read it to an accuracy of 4 lb in 600 is unnecessary. The chart results are accurate enough for all normal condensate load calculations. **End**



The way the job is started. Just brush on vinyl bond B.

Hole in window is covered with paper held in place by tape.

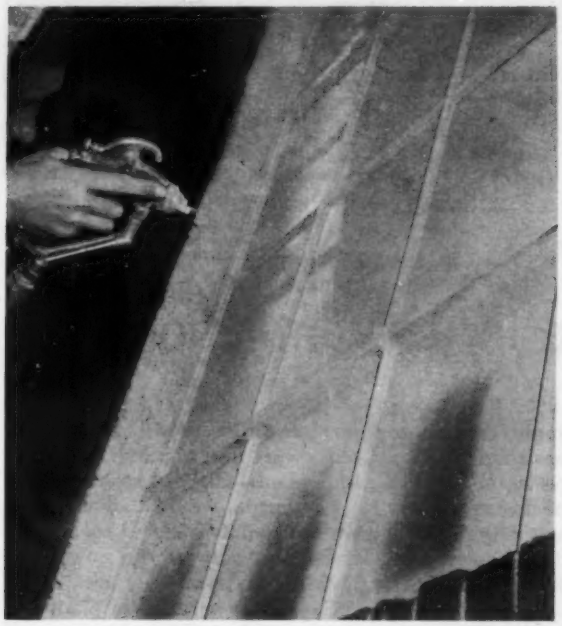
The coating itself is applied in a 15 to 20 mil thickness by subsequent overlapping coats of 5 mils per pass of gun.

SEALING A BUILDING?
Here's How RCA Saved $500 Per Month

IF YOU HAD AN old building you were using as a warehouse, and window glass replacement was costing you up to $500 per month what would you do to eliminate this needless expense? If you didn't need the windows for daylighting or for ventilation of plant, how would this affect your ultimate decision?

Those were the conditions at the Welsbach plant of RCA in Gloucester, N. J. When RCA took the plant over as a warehouse the buildings had received little or no maintenance for a number of years. Rust and

Next, spray over the paper which was used to bridge hole.



Close-up shows ability of the coating to web over the cracks.

corrosion had just about ruined the steel sash and the $500 per month glass replacement cost was intolerable. Maintenance, under instructions from the plant engineering department, tried several methods of eliminating the problem. It was finally decided that two methods would be explored. 1. To erect a 2 by 4 stud frame in the sash recess and then use plywood or other building material to provide protection from the elements. 2. To apply a Cocoon coating over the entire window opening.

Tests showed that the handling of sheet material 4 ft by 8 ft in size would be a dangerous job unless scaffolding were to be erected. In addition, labor costs for this method of sealing would be considerably greater than they would be for Cocooning. So, method 2 was adopted.

This sprayable vinyl plastic coating is applied with standard spray equipment by the following procedure:

1. Wire brush the steel sash to remove loose rust and dirt.

2. Apply vinyl bond primer, with a brush, to the concrete around the perimeter of the sash. Cover an area about 12 in. wide.

3. Agitate the Cocoon coating thoroughly and add the desired pigment while agitating. No thinner is needed inasmuch as these coatings are formulated in a ready-to-spray viscosity.

4. The coating is applied in a 15 to 20 mil thickness by subsequent overlapping coats of 5 mils per pass of the spray gun. There is no need to allow for a drying time between coats. In areas where glass was cracked, shattered or missing completely, repair was made simply by placing a piece of paper over the opening and holding it in place with masking tape. The paper provides a base on which the coating is sprayed. When the coating dries it is a tough, flexible sheet.

For Dust-Free Areas

RCA again capitalized on the versatility of this coating when they used it to provide a dust seal on the interior of steel sash and glazing. This when they needed a dust-free area for completion of a Government contract. The alternate proposal was to tear out the sash and replace it with solid construction. The Cocoon, made by R. M. Hollingshead Corp., Camden, N. J., provided the dust seal, a small amount of light transmission, and placed the area in readiness for manufacturing at a much earlier date and at a considerable saving over other methods.

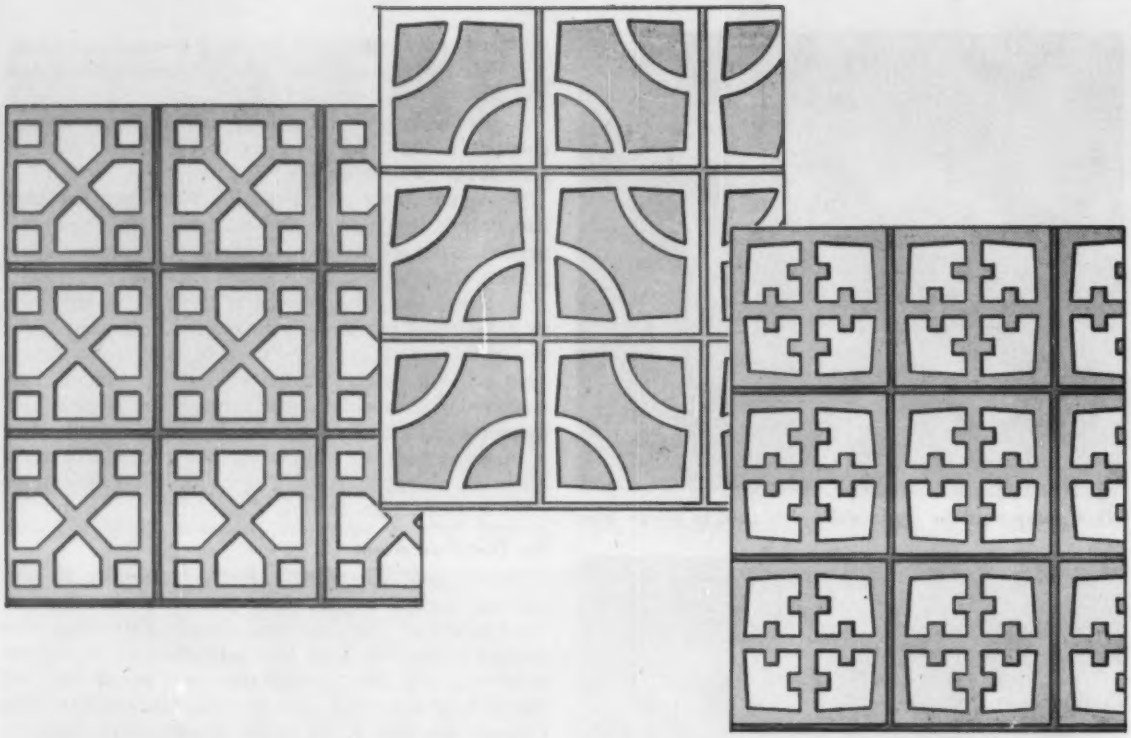
Procedures for dust-proofing the interior of sash, regardless of the type of material of which it is constructed, is much the same as that employed in sealing the exterior. The entire center of the window pane can be left uncoated and the coating concentrated at the glazing or other points where dust may filter in.

Seals Out Insects, Too

These coatings have also been used in bakeries to prevent filtration of flour dust in cracks and crevices where insects might feed and breed; in areas of plants to prevent permeation of odors or fumes into offices or other parts of the plant; for sealing of tobacco warehouses for fumigation purposes; and for sealing of railroad cars and trucks to prevent loss of bulk products in transit.

For Leaking Skylights

Sealing of leaky skylights, a long-time bugaboo of plant engineers in old buildings, is another application where Cocoon has proven extremely effective. Two systems have been devised, depending on whether the skylight is still to be useful or no longer has any value as a source of light and can be made opaque. About the only difference to be considered in skylight application as compared to windows on sidewalls is the thickness of the coating. A minimum 30 mils thickness is recommended to compensate for the much greater abuse the skylight must take from the weather. Regardless of the application, interior or exterior, the application technique is much the same as described above. Application can easily be handled by competent workmen with a minimum of instruction. **End.**



SCREEN BLOCKS—

Add Beauty to Plant, Aid In Its Ventilation

NOT OFTEN does the plant engineer get a radically new building material . . . in an old and familiar form. But in screen blocks—the concrete block gone modern—he does.

He also gets versatility unmatched by any concrete block of the past: a non-structural decorative block which, installed indoors, partitions without actually walling-in, screens while it ventilates, beautifies as it controls light and solar exposure.

Exteriorly, screen-block walls can revitalize your plant's motif, hide unsightly processes and, erected as a decorative buffer, can shield a building's exterior from sun, wind and rain (increasing paint life by years).

Screen blocks—also called vented blocks, grille blocks and design blocks—are as radical as all that. Basically, however, they're nothing more than concrete blocks molded with open—and decorative—designs.

Where, for example, the face of common block is solid, screen block—in effect—is open-faced, a veritable shell. The design is paramount, thus by necessity it sacrifices strength and, in some cases, revolutionizes shape (one screen block is 6 in. by 6 in. and 4 in. thick. Another—under the trade name Solar Screen—is 4 in. by 4 in. by 4 in., its face cut with a 2½-in. diameter hole.

Openings—dozens of different designs are available—are as functional as they are decorative: they pass light, but in subdued amounts; they permit circulation, but baffle any strong, disturbing currents.

Further, when a screen wall is erected to curtain an existing plant wall (usually on a southern or western exposure), an insulating air-space is created which cools the plant in summer, blocks cold in winter.

First used (in 1957) to both wall and decorate a Pasadena, Calif., plant (The Stuart Co., a pharmaceutical firm), screen blocks are fast finding their way into plants all across the nation.

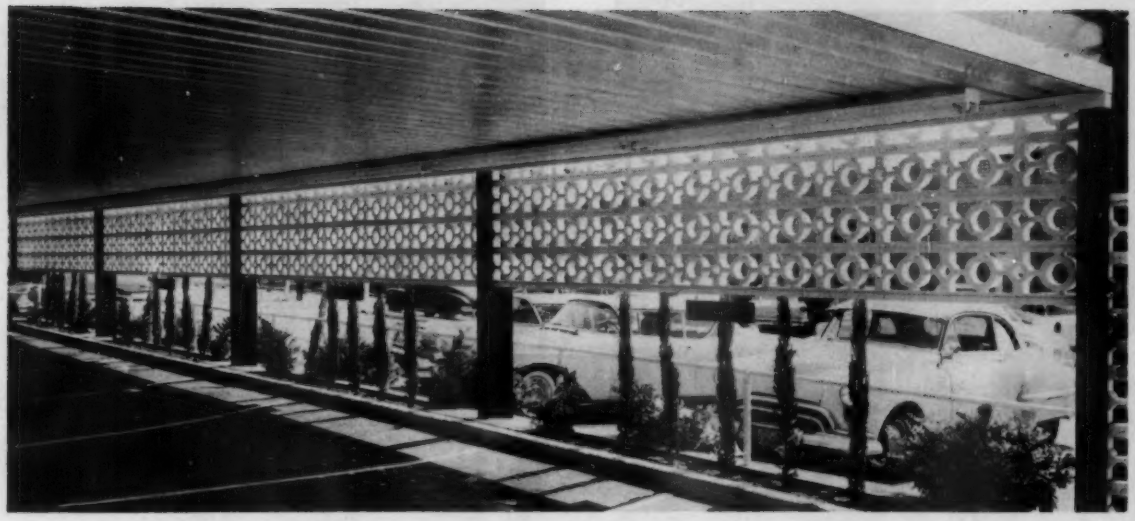
California, where they originated, has to date boomed them most enthusiastically as the new plant building material they are.

Says a Los Angeles plant engineer, "A screen-block wall achieves beauty, solar control and ventilation—simultaneously."

Enthuses another, "It's a safe bet that every plant, sooner or later, will be using screen blocks, one way or another."

Some of the ways:

1. As substitutes for lath and plaster . . . the non-bearing structure hung as a kind of curtain.
2. Outdoors—as at one plant—to hide its parking lot.
3. As solar and ventilation control panels in plant walls.
4. As minimum-maintenance office partitioning (two coats of water-based acrylic should, say block designers, give years of maintenance free wear).



Here, screen blocks are used not only to screen a parking lot but also to accentuate shrub plantings and architecture.

One plant, just now putting up a screen wall both to decorate its exterior and to insulate against southern exposure, figures the wall will keep its building 10 deg cooler in summertime, reduce fuel bills come winter, and protect exterior paint upwards of three years.

Screen blocks — as their name implies—screen. Non-structural, they cannot be installed as bearing walls. Within these limitations, however, screen blocks open a new vista for plant engineers.

How do they differ from the familiar and standardized concrete block?

1. *Size:* Typically, the standard two- or three-celled block is nominally 4 or 8 in. thick, its face 8 by 16 in. Screen blocks, on the other hand, are commonly 4 or 6 in. thick, their face dimensions varying from a modular 12 by 12 in. to 12 by 18 in. (Like most common concrete blocks a screen unit specified as 12 by 12 in. actually measures 11⅝ by 11⅝, this to allow for the usual ⅜ in. joint.)

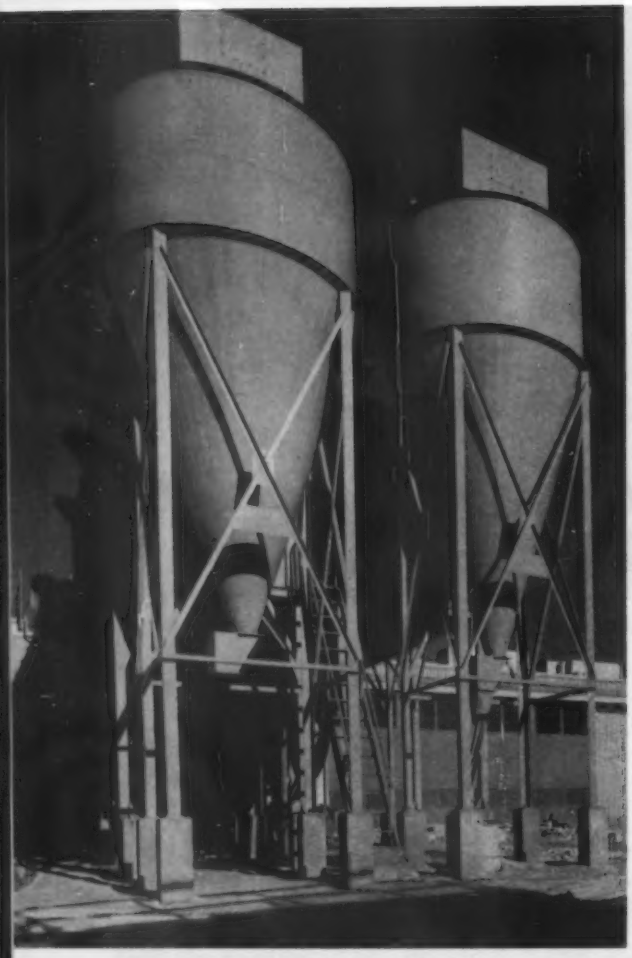
2. *Crushing strength:* Standard Class A block must have a strength of 1000 psi to pass most building codes (this, for bearing material). Screen blocks, although some exceed 2000 psi, usually fall far short of required bearing strength (typically, one of the most decorative design-block tests but 300 psi).

3. *Weight:* Where the typical 8 by 8 by 16 in., 3-celled concrete block weighs upwards of 40 lb, screen blocks the same size scale out to perhaps 17 to 21 lb (thus, design blocks weigh little more than their equivalent in lath and plaster). At the moment, screen blocks (in quantity) cost anywhere from 50 cents to $1 apiece, compared to 20 to 30 cents for non-design types.

4. *Reinforcement:* Screen blocks differ as radically in reinforcement from common blocks as they do in design.

(Continued on page 172)

The Stuart Company, a Pasadena pharmaceutical concern, was among the first to use screen blocks on a grand scale.



Above: Terminal points for the plant's system of dust collecting piping are these two cyclones. Right: View of plant's roof shows utilities and penthouses. When this photo was taken, one cyclone was on the ground.

ROOFTOP USE—OVER AND UNDER

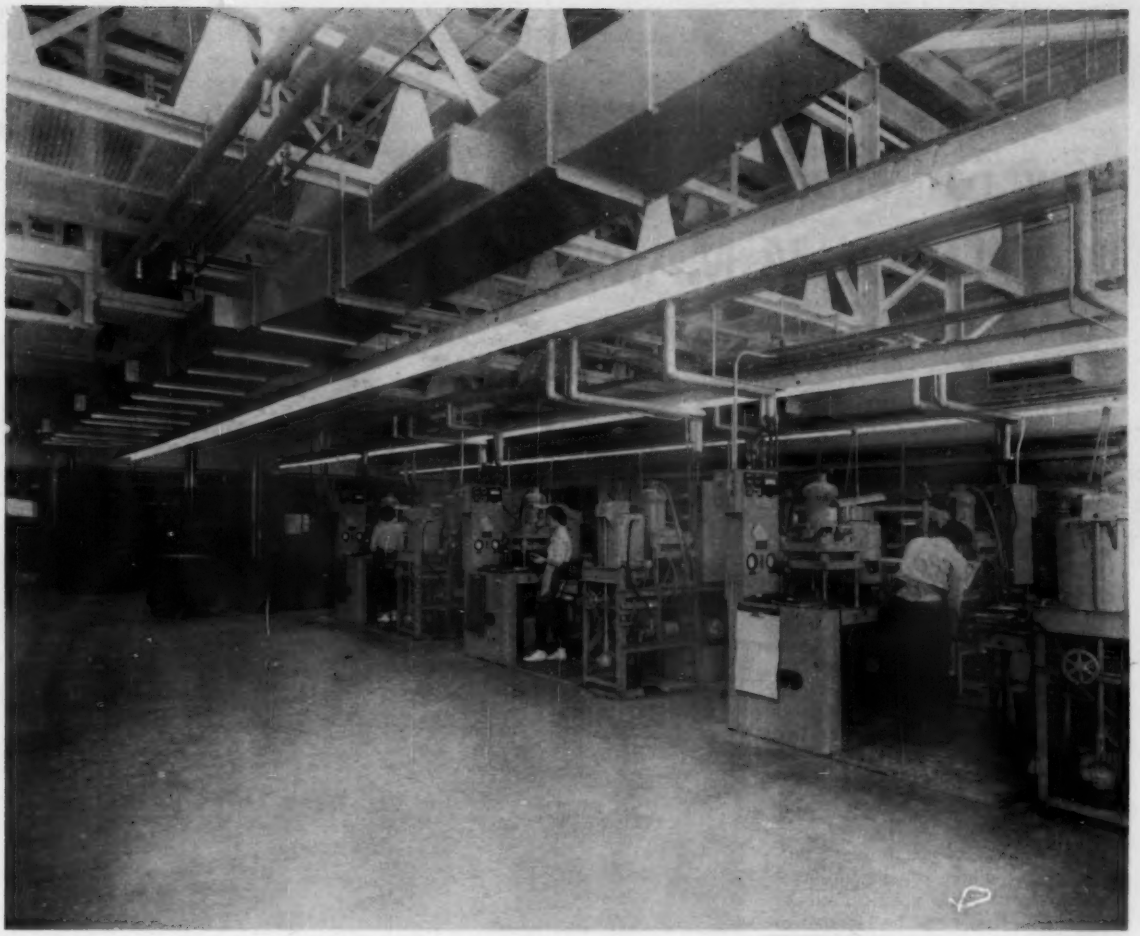
ARE YOUR PLANT floor areas crowded? Do you have lots of roof space—above and below—that's just sitting there doing nothing? If so, read on.

An outstanding showcase for the growing use of roof and under-roof space to mount a wide variety of utility equipment and service piping is highlighted sharply in a new $4,000,000 precision casting plant. The plant, a new facility for Austenal, Inc., was built at LaPorte, Ind. by Wigton-Abbott Corp., Plainfield, N.J.

Located on a 200-acre site, the 200 ft by 400 ft building has a structural steel frame with 40 by 40 ft bays designed to minimize columns and increase space utility. The design permits sufficient framework strength for the mounting of hoppers, conveyors and service piping without the addition of reinforcement or floor-mounted supports.

Concrete planks with standard 1-in. insulation make up the roof. Designed to hold a great deal of equipment, the roof contains three penthouses—a stairway penthouse, a conveyor penthouse, and a penthouse for the x-ray hoist. Also roof located are the air handling units for the air conditioning system, conveyors, fans and blowers, and the piping system for dust collection.

This structural setup permits the placing of all heating, air conditioning ducts and all other service facilities such as water piping, dust collecting systems, compressed air piping, steam piping, natural gas, and electrical distri-



Under-roof areas have also been utilized to fullest extent. Heating, air conditioning ducts and all other service facilities such as water piping, compressed air, steam and natural gas piping, electrical distribution systems are under roof.

bution systems underneath the roof framing where they are out of the way of production and are easy to maintain.

Basic electrical power facilities are arranged for extreme flexibility in providing for future growth by the addition of indoor substations. For any layout of either floor-mounted or ceiling-mounted equipment, power is available within a few feet.

At present, the compressed air for plant use comes from 2 single-stage horizontal units. Each is 125 hp, 700 cfm (standard free air) 100 psig delivery pressure. For the future, one similar unit will be added.

Each compressor has an intake filter and silencer, a water-cooled aftercooler, an oil and moisture separator, automatic selective control, i.e., (choice of start-stop control or valve unloading with continuous motor operation), and automatic control of jacket-cooling water.

An unusual feature of the facilities underneath the roof is the inclusion of a compressed air drier piped in the system between the aftercooler and a large receiver. This drier uses refrigeration to cool air from 100 F entering to about 45 F leaving. It is sized to handle future as well as present loads i.e., 2100 cfm. The drier is essentially a modified package-type water chiller with a special refrigerant-to-air heat exchanger substituted for the usual refrigerant-to-water exchanger.

The gas utility is also located beneath the roof and is brought in at 28 psi pressure. It is metered at high pressure and is then reduced to about 10 psi for plant distribution and still further reduced at the points of actual usage.

There are five gas furnaces each burning approximately 7000 cfm gas—total peak gas consumption is 35,000 cfm. These furnaces are used for the burn-out of wax from molds (wax or plastic patterns for investment casting process).

Cooling water is required for air-conditioning (hermetic centrifugal compressor), for air pressure cooling and for the miscellaneous cooling of process equipment (small usage). An induced draft cooling tower is mounted over a concrete sump located in back of the building. The tower is rated at 1200 gpm with water entering at 100 F and leaving at 85 F.

Vertical turbine pumps are set

(Continued on page 172)

How To Reduce Your WASHROOM MAINTENANCE COSTS

OF THE ANNUAL cost for maintaining an average industrial plant washroom, 80 to 90 per cent is spent for labor. Only 10 to 20 per cent goes for supplies, equipment and miscellaneous items. According to the Washroom Advisory Service* of Scott Paper Company, savings can be effected by determining washroom maintenance objectives and initiating a program to achieve them.

Significant cost reductions can be made in the area where most money is spent—janitorial service. Equipment now in use should be inspected to determine whether it can be altered or replaced to reduce servicing costs.

A four-point program is recommended to effect washroom cost savings: (1) make a physical survey of all items that must be cleaned or serviced in the washrooms; (2) list the desired frequency of cleaning and allot sufficient time for each operation; (3) assign necessary personnel to specific work areas; and (4) closely supervise the work schedule to insure efficient performance. Putting the program into effect ordinarily entails modification of present washroom facilities so personnel can avoid wasted time and undue effort.

Where possible, new fixtures and equipment should be installed to simplify maintenance jobs. For instance, recessed fluorescent lighting is recommended in washrooms to make cleaning easier and faster than washing and wiping old-fashioned incandescent light fixtures. Fluorescent lighting also provides the bright, cheerful type of atmosphere that employees and the public associate with health and sanitation.

Wainscoting the walls behind washbasins with a material such as porcelainized steel tile to a height of 80 in. from the floor eliminates the need for splashboards and immediately decreases maintenance time. Tile comes in many colors and can be applied to any surface with little preparation.

One of the washrooms in Polaroid's new plant. Note the recessed soap dispensers, shelf for glasses and jewelry, and the recessed towel dispenser-receptacle units.

Having adequate supply closets near or in washrooms reduces time needed by janitors to replenish soaps, towels, and tissue, and to obtain cleaning equipment.

The proper number of fixtures, such as towel cabinets, as related to washroom traffic is important. Lack of enough fixtures to satisfy traffic needs will result in extra service trips and increased maintenance costs. Fixtures should be serviced only at time washroom is cleaned.

Traffic flow is a vital factor to consider in effecting economy and better employee relations. Department of Labor statistics show that one minute wasted per employee per day in a poorly planned washroom can result in a loss of $7500 a year in a plant employing 1000 people. Frequently, a smoother flow of traffic can be made possible merely by moving one or two of the fixtures so they fall into a logical progression.

Facilities should progress from entrance to exit in the following order—washbasin to towel fixture to waste receptacle to mirror. Towel fixtures should be 30 in. from the washbasin and five feet from the floor for greatest efficiency. Waste receptacles should be placed 36 in. from the towel cabinet and the mirror 36 in. from the receptacle. This arrangement draws the user toward the exit effectively, reduces loitering, frees each facility for the next user, and eliminates traffic jams.

One towel dispenser per three washbasins is recommended, and one waste receptacle for every two towel dispensers is usually sufficient. Towel cabinets should be of simple but rigid construction and of modern design to dispense towels.

Either the open-top or expanded

*Readers can avail themselves of this service by indicating "Washroom Design" on one of the post cards in this issue.

steel mesh waste receptacles are recommended for efficient performance although recessed towel cabinets provide a built-in waste receptacle and add a more distinctive, modern look to the washroom.

Individual washbasins are recommended in washrooms serving office and manufacturing areas where work is clean and traffic light. Circular or semi-circular washfountains are ideal for heavy traffic at peak hours.

Toilet booths should have doors for privacy. The white, open-front type toilet seat is most satisfying for added hygienic protection, cleanliness and less maintenance. Wing-type urinals afford privacy without requiring additional partitions. There is less surface to be cleaned, and floor cleaning underneath is reduced.

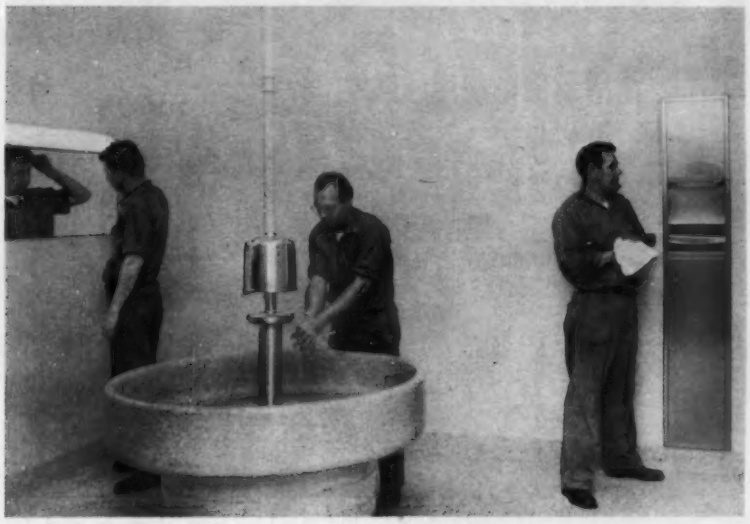
Liquid or powder soaps are recommended because they eliminate the hazard of personnel slipping on bar soaps that have fallen unnoticed to the floor. Servicing requirements are reduced if a large container or central storage tank can be installed in the wall behind the basins for a gravity feed liquid-dispensing system.

Industrial plants throughout the country have or are including such recommendations in the design or renovation of their washrooms. Here are just two examples of what some of them are doing.

Streamlined washrooms are a feature of the new film-processing plant of the Polaroid Corporation at Waltham, Mass. By designing the washrooms for streamlined operation, the company is realizing a double saving.

All 10 washrooms on the three floors of the structure can be serviced by only one man and one matron. They perform their duties so rapidly that they have time for other custodial jobs.

Some of the features of the washrooms are terrazzo floors, ceramic tile walls, attractive modernistic light fixtures and paper-towel dispensers that are recessed into the walls—as well as recessed ashtrays.



In the men's washrooms, circular wash fountains make washings easy for several men at a time. A mirror located near exit keeps traffic moving in right direction.

The women's rooms have lipstick bars with their own mirrors and their own dispensers of facial tissues, all located away from the sinks so as to speed up the flow of traffic. Locker rooms adjoin the washrooms and are set apart from the sinks and toilets.

Washroom areas at American Airlines new $4½ million maintenance facilities at Los Angeles International Airport were laid out a little different to fit in with their type of operation.

To keep the planes "immaculate," the employees themselves must be clean. Hence, it is a matter of simple economy to offer easy-to-reach washing accommodations to these workers.

As a result, the four washrooms in the hangar area have their washfountains, towel dispensers and mirrors located in open bays, immediately adjacent to the places where the men are working. Toilet facilities are in adjoining rooms.

According to James E. Hannaford, foreman of plant maintenance and a veteran maintenance official with the airlines, this arrangement saves 35 per cent in man-hours alone, as compared with places where washing facilities are not so carefully located.

He lists these features of the washrooms as making possible both economical upkeep and attractive appearance:

All toilet booth partitions are hung from the ceiling and lavatories are wall-mounted, so cleaning the floor is easy. To provide good appearance and sanitation in the washrooms, ceramic tile wainscoting rises 48 in. from the floor. Above the tile, the wall surfaces are painted gray and the ceilings are white. Tile floors in the men's washrooms are blue; in the women's washrooms they are red.

Recessed washroom lighting is fluorescent. The washrooms are air conditioned in the office areas and mechanically ventilated in the maintenance areas. Individual soap dispensers furnish liquid soap. Janitor supply closets are within quick reach of each washroom.

In the four employee locker rooms, the lockers are ventilated individually by means of vents. They set flush with the floor to avoid accumulation of dirt underneath. And the tops of the lockers are slanted, so miscellaneous articles do not accumulate on top. **End**

Mopping the floor is made easy by the wall-hung feature of this wastebasket and other fixtures at American Airlines.

Three Reasons for This Conveyor: Simplicity, Low Cost, Utility

WHEN YOU NEED something and can't buy it—build it! This is the attitude of engineers at Arcadia Metal Products, Fullerton, Calif. Established in 1948, the company produces aluminum, steel, and stainless steel frames for glazed sliding doors, windows, and window-wall construction.

As might be expected in a new plant in a new industry, some puzzling production problems evolved along the way. One such problem had to do with conveyorization in the production department turning out aluminum window frames. The conveyor must segregate the several components used in a single window frame and move them together towards the final assembly operation. It had to show at a glance whether or not these component groups were complete, and if not, which components were missing.

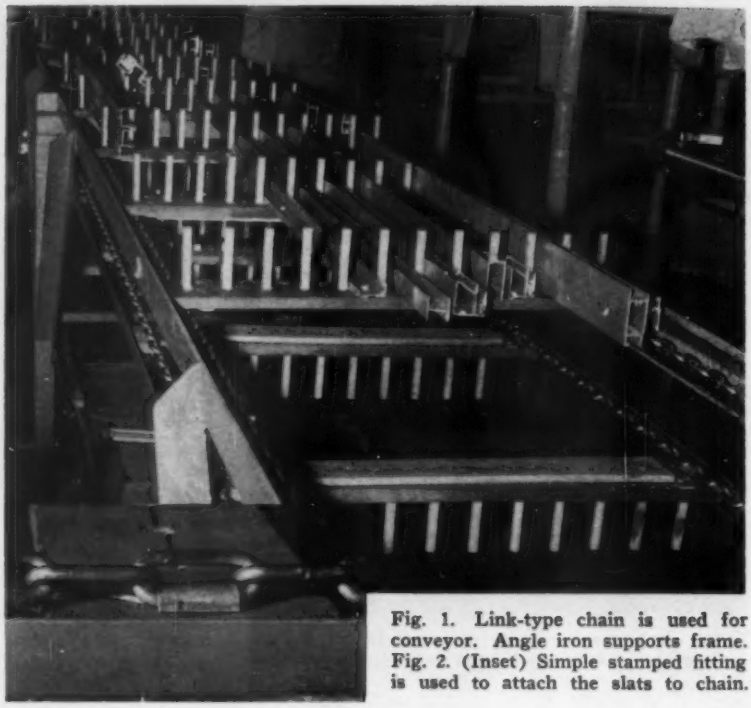


Fig. 1. Link-type chain is used for conveyor. Angle iron supports frame. Fig. 2. (Inset) Simple stamped fitting is used to attach the slats to chain.

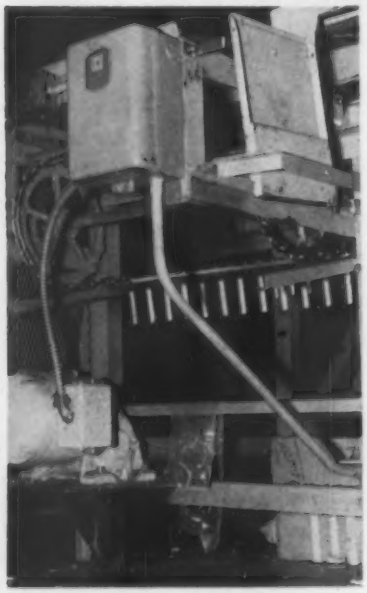


Fig. 3. Conveyor drive mechanism consists of ½-hp motor with speed reducer, geared to conveyor by sprocket chain.

Company plant engineers designed and built a conveyor, the main features of which are its simplicity, low cost, and utility for the type of work it must do.

The structure for the conveyor is workbench height, and fabricated with angle irons and straps. Two angle irons installed parallel to each other two feet apart and running the length of the conveyor table serve as tracks for the upper part of the conveyor chain. Simple ¼-in. link chain was used.

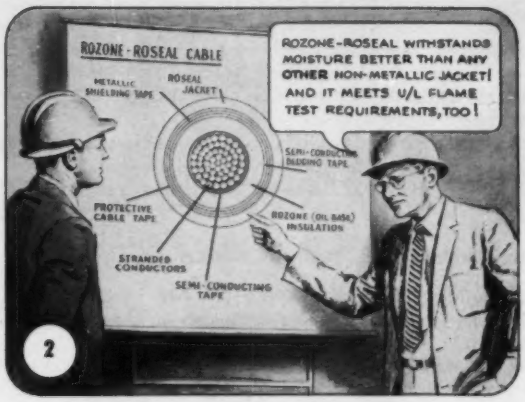
The wood conveyor slats, 1 in. by 4 in. by 24 in. in size, are attached to the chain links with a simple punch-press produced fitting. The narrow end of this fitting is looped over the chain link, with no welding involved. The uprights in each conveyor slat are ½-in. by 4-in. wood dowels. These uprights separate the various window frame components and production workers along the conveyor line can tell at a glance whether or not the required number have been placed on the line.

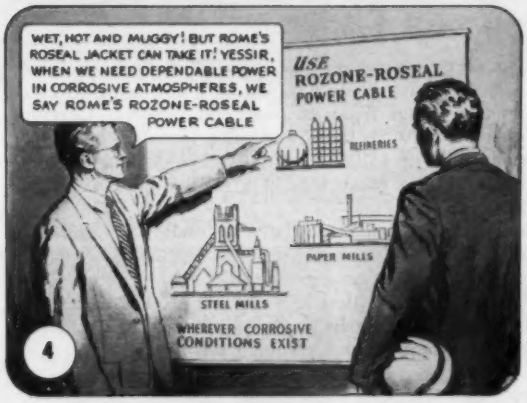
A ½-hp motor drives the entire installation, and a simple sprocket drive moves conveyor at 3 fpm.

In use, this conveyor, approximately 100 ft long, travels between rows of production machines used to cut, notch and pierce assembly holes in the window frame components. As the conveyor passes a specific machine, the frame member produced at that point is placed in a designated slot provided by the dowel uprights. When the conveyor reaches the "end of the line," the slots have been filled and the frame members are removed from the conveyor for the final assembly operation. **End**

DANGER! CORROSION AT WORK...

IN CORROSIVE AREAS, WE USE ROZONE-ROSEAL POWER CABLE. THAT ROSEAL JACKET IS TOPS AGAINST OIL, CORROSIVE FUMES, AND MOST CHEMICALS
1




WET, HOT AND MUGGY! BUT ROME'S ROSEAL JACKET CAN TAKE IT! YESSIR, WHEN WE NEED DEPENDABLE POWER IN CORROSIVE ATMOSPHERES, WE SAY ROME'S ROZONE-ROSEAL POWER CABLE
USE ROZONE-ROSEAL POWER CABLE
REFINERIES
PAPER MILLS
STEEL MILLS
WHEREVER CORROSIVE CONDITIONS EXIST
4

A matter of FACT

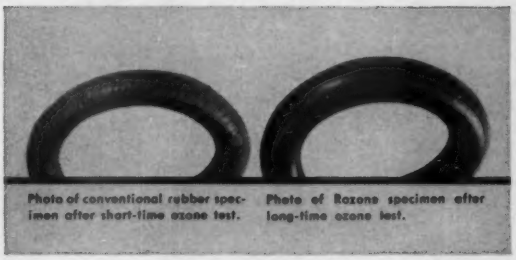


Photo of conventional rubber specimen after short-time ozone test. Photo of Rozone specimen after long-time ozone test.

Rozone insulation is high in dielectric and impulse strength and has excellent resistance to corona and ozone cutting.

Available in voltage ranges through 15 kv Rozone-Roseal preferred power cable may be installed in air, conduit, underground ducts, or directly in earth. Your choice of premium ozone-resistant insulations: Rozone (oil-base) or Rozone A (butyl-base). For complete information, contact your nearest Rome Cable representative and ask for Bulletin RCD-700. Or mail the coupon today.

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Plastic Window-Walls Keep Building Light and Maintenance-Free

LOWER MAINTENANCE costs and better interior lighting are two advantages of the new plant of Midwest Metallic Products, Inc., Cleveland, Ohio.

Constructed of brick over a steel framework, the building consists of two identical bowed-roof manufacturing sections and an office section. Natural light for the manufacturing area is provided by window walls of fiberglass-reinforced panels in two ends of the plant.

Installation costs were significantly reduced through the use of these panels under the curved arch roof. Lightweight and easy to handle, they were fastened to the building framework with self-tapping, cadmium-plated screws with neoprene-backed stainless steel washers. Panel joints were cemented to provide a weather-tight, structurally strong curtain wall.

Most important advantage of the translucent walls is their transmission of natural light. With both the north and south plant walls made of fiberglass panels, there is always plenty of daylight for plant illumination.

The corrugated, pebble-grain panels resist fading and

erosion from bright sun and severe weather, and have a self-cleansing action. Their color filters glare from sunlight, transmits illumination with less infra-red and ultra-violet rays.

Made by Structoglas Division of International Molded Plastics, Inc., the fiberglass-reinforced panels are self-extinguishing, with a flame-spread rating less than 70.

Stacker Crane, Special Racks Keep 4½ Million Pounds of Steel in Place

LOCATED ON A 32-acre site five miles from Hartford, Conn., a new plant has been opened by the Allen Manufacturing Co., to produce hex-socket cap and set screws.

The plant comprises a 250,000-sq ft single-story manufacturing section and a two-story, 20,000-sq ft office building. Interconnecting the two buildings is a long glass-enclosed corridor—unusual in that it serves as the main entrance to the plant.

One of the most significant features of the new plant is an entirely new idea in handling and storage of bar and rod stock. It offers maximum use of space and efficient selectivity of material.

The system features a special stacker crane and "Christmas tree" racks. Bundles 12 ft long, weighing up to 6000 lb, are easily handled by a one-man-operated crane that hangs from an overhead runway. Carrying its operator with it, the crane rides forward, backward, sideways and up and down a network of stacks. Capacity of the stacks is more than 4½ million pounds of bar and rod stock.

Incoming material, normally in reels or bundles, is unloaded at the dock. Reels are hauled by fork lift trucks, and bar stock is carried by a 3-ton hoist riding an overhead crane that traverses the dock area. This hoist also rides overhead rails into the storage area, where incoming stock is transferred to the stacker.

Nuclear Reactor Replaces "Old Fashioned" Atom Smasher for Research

NEWEST ATOMIC RESEARCH "tool"—the Westinghouse Testing Reactor—was previewed on October 21, as the company decommissioned its oldest atomic tool, the world's first industrial atom smasher.

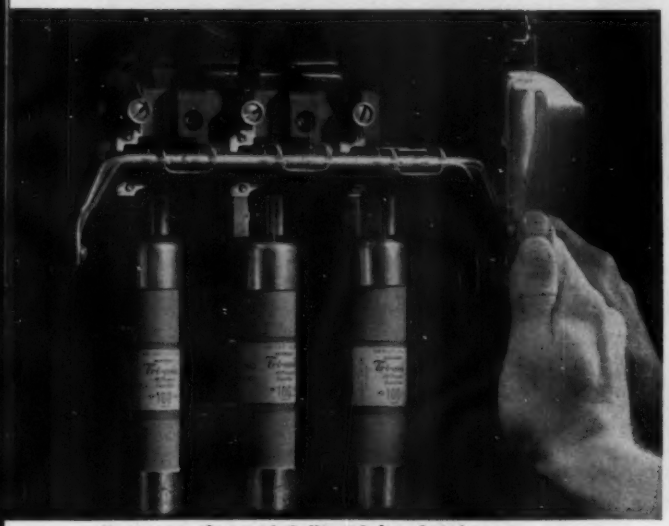
Primary purpose of the WTR will be to subject materials and nuclear fuels to radiation conditions similar to those encountered in an operating power reactor.

A large vapor container—an 85-ft high cylinder measuring 70 ft in diameter and made of ⅜-in. steel plate—will house the nuclear reactor itself. When the reactor is operating, air changes will be made every four minutes, inside the container. Air pressure in the vapor container will be slightly negative, so that any leakage will be into the container, rather than out to the atmosphere.

Initially designed for operation at a level of 20,000 kilowatts of heat, the plant has been constructed to permit operation up to 60,000 kilowatts, with additional equipment and minor modifications.

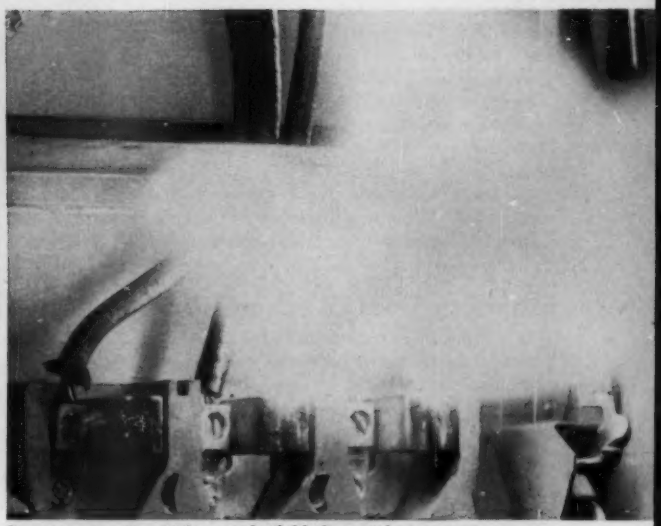
FOR SAFETY'S SAKE, BUY VACU-BREAK

With BullDog's exclusive clamped-pressure switching contacts



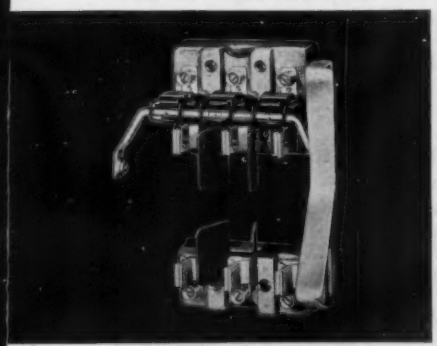
Maximum safety with BullDog Safety Switches

Arcs are smothered before they can cause fire hazard or damage to the switch because contacts are housed inside compact Vacu-Break* chambers. Pitting and burning of contacts are reduced to an absolute minimum—maintenance is virtually eliminated.



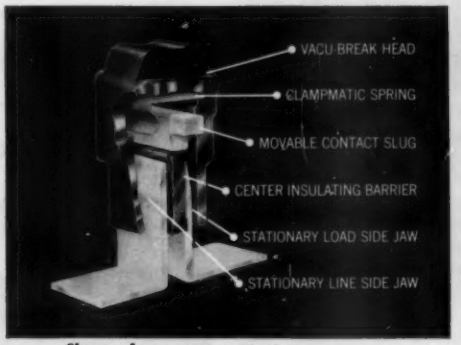
Dangerous arcing with open knifeblade switches

Unconfined flash explosion occurs, burning and pitting blades. Fire hazard and frequent maintenance are the result. These are unretouched photographs of 100 amp, 600 volt switches, operating under 90 ampere, 440 volt load with 40% to 50% power factor.



Simple, foolproof switching

Vacu-Break heads are *directly* connected to the switch handle. No toggles, triggers or springs to fail. No danger of switching failure. Positive, safe switching *every time* for a lifetime.



Clamped-pressure contacts

This close-up shows movable contact slug and Clampmatic* spring assembly inside Vacu-Break chamber. The Clampmatic assembly assures clamped-pressure contacts, speeds "break", increases switch life.

Withstand 100,000 amp fault current

BullDog Vacu-Break Switches—Master and Junior—will withstand 100,000 amp short circuit current when equipped with current-limiting Amp-Traps**. Play it safe—recommend and buy BullDog Vacu-Break!

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**Amp-Trap is a registered trademark of the Chase-Shawmut Company.

BULLDOG

BullDog Electric Products Company, Division of I-T-E Circuit Breaker Company, Detroit 32, Mich. *BullDog Export Division:* 13 East 40th St., New York 16, N.Y. *In Canada:* BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Rd., Toronto 15, Ont.

For more facts circle 566 on Reply Card

Laboratory for Nuclear Metals Goes "All-Out" for Safety

WITH ONE-THIRD of the cost of its new research building accounted for in the installation of safety equipment, Nuclear Metals, Inc., Concord, Mass., considers the plant adequately equipped to safeguard employees and the community from possible hazards of working with modern metals and materials. In addition to elaborate in-plant safety devices, NMI has eight property-line monitoring stations to sample air, soil, ground water, rain and snow for any evidence of environmental changes.

The plant has 32 separate ventilation systems, capable of exhausting nearly 150,000 cu ft of completely filtered air per minute from the working areas. This air is collected, washed, and filtered by specialized equipment before being released to the atmosphere.

A vacuum cleaning system extends in duplicate throughout the building; all floors are of a special easy-to-clean plastic. Heating plant and air compressors are duplicated to provide service in case of failure of one plant.

A drain system of pyrex glass serves all laboratories using acids, while a completely housed facility treats the wastes to eliminate exterior environmental hazards. Closed-circuit television is in service on a 24-hour basis, as a safety and security measure. A standby 140kw generator, diesel-powered, insures continuous power for essential experiments and services.

High voltage electric lines to supply heavy machines, induction heating devices and other equipment are placed under the floor, to minimize electrical hazards.

Stainless Steel "Kitchen" Processes Fruit at the Market, Not the Source

ONE OF THE FEW outside the American citrus fruit belt, a fresh-fruit primary processing unit has recently gone into operation near Chicago. Designed to process fruit sent "as-picked" from the growing areas, the plant is operated by the Home Juice Company.

Heart of the plant is a group of stainless steel compounding tanks, with its related piping and controls. A sealed system handles all juice coming from the extractors, piped to the compounding tanks through stainless steel pipe runs. The piping can be dismantled, washed and sterilized after each batch run of juice.

From the tanks, the fruit juice is cooled in heat exchangers and sent to the bottling machines.

Capable of processing 192,000 oranges in an eight-hour day, the extractor unit at the plant occupies an area approximately 65 ft by 30 ft by 15 ft. Supporting equipment includes the stainless steel "tank farm" described, a 150,000-lb capacity storage hopper for sugar, six automatic bottle-fillers, and a 4800-bottle-per hour automatic washer.

Slated for early installation is a carton-filling machine that will fill and cap 18,000 cartons per hour.

New School Furniture Plant Features Latest Machinery, School Research Center

RECENTLY OPENED in Kalamazoo, Michigan, what is regarded as the most modern school equipment facility in the world is a producing unit of the Brunswick-Balke-Collender Co. The $4,000,000 building, with 150,000 sq ft of manufacturing space, features several "firsts."

Brunswick has introduced the Steinemann flow-coater to this country—a new painting method for flat panel work. Designed and manufactured in Switzerland, this new equipment cuts production and drying time from the previously needed six hours to one-half hour. It produces a more uniformly-coated flat panel, while eliminating waste of paint materials from overspray.

In metal fabrication, the firm has brought in a six-ton non-mandrel bending machine that quadruples production capacity for formed tubing used in making chairs.

Another feature of the plant is the school research center in the administration building. In a model classroom, Brunswick demonstrates the advantageous use of furniture of good design function and color in the classroom. These facilities will be used as a research center for the plant, and will be made available to school administrators who may wish to plan their needs on an actual layout.

CHANGE LIGHTING FIXTURES AS OFTEN AS YOU WISH WITHOUT COSTLY REWIRING

Modern BullDog 20-amp Universal Lighting Duct permits fixture modernization at substantial savings over pipe and wire systems.

You know what an expense it is to install new lighting fixtures, especially when you're saddled with a pipe and wire electrical system. Extensive and *expensive* rewiring is just the beginning. There are fixture locations to plan, new hangers to install . . . and usually long production shutdowns. Waste is great, too, since old wiring can never be reused.

It's just the opposite with 20-amp Universal Lighting Duct. The system is exceptionally easy to install—both feeds and supports lighting fixtures. Twist-in plugs attached to each fixture let you tap into power in seconds. No costly rewiring. No production shutdowns. The entire system can even be relocated without loss if the need ever arises.

Further, since fixtures can be positioned at any spot along the duct, you can reposition them or add new ones whenever desired. In short, ULD will suit your lighting needs *exactly*, now and in the years to come.

When you modernize your lighting, modernize with BullDog Universal Lighting Duct. It is, *by far*, the most flexible and economical lighting system ever devised. © BEPCO

BULLDOG

BullDog Electric Products Company, Division of I-T-E Circuit Breaker Company, Detroit 32, Mich. *BullDog Export Division:* 13 East 40th St., New York 16, N.Y. *In Canada:* BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Rd., Toronto 15, Ont.

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Sylvania announces a major break-through in fluorescent lighting

Now for the first time standard fluorescent lamps delivering . . .

Over **70** *lumens-per-watt in the popular 40-watt, 4-foot lamps*

Over **75** *lumens-per-watt in the 75-watt, 8-foot lamps*

This startling increase in lumen output means you get more light for the same power consumed than ever before. Yet this remarkable development in lighting performance has been achieved with *no* sacrifice in lamp life!

This impressive contribution to lighting efficiency comes from brilliant laboratory work by Sylvania engineers on phosphor structure and processing techniques. As a result, these higher lumen ratings are now available for the Sylvania standard eight-foot, 75-watt lamp and the popular four-foot, 40-watt lamps. Very soon all other popular Sylvania lamp types will have similar higher ratings.

Check your Sylvania Representative immediately for full details about this extraordinary development and learn why —more than ever—*Sylvania fluorescents give you more light at lower cost than all other brands!*

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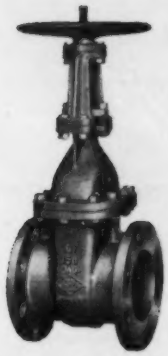


In this **Split Wedge Gate**

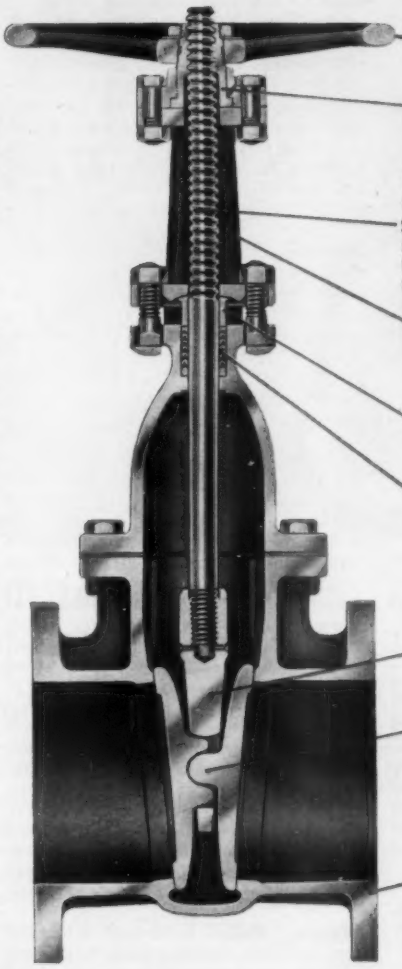
you can see why it pays to

Specify JENKINS for STAINLESS STEEL Valves, too

This picture shows the many points of excellence in the design and construction of Jenkins Fig. 1327 Split Wedge Stainless Steel Gate Valves. Compare them with any valve you know. You'll conclude that it's hard to beat Jenkins at making valves, no matter what the material.

But no picture can show the quality of the castings . . . the precision machining . . . the rigid inspection and testing that have gone into this valve. All of these are as important as design and metal alloys in assuring long, dependable, economical valve service. And, all of them are up to the peak standards for which Jenkins has been known for almost a century.

SEND FOR NEW CATALOG of Jenkins Stainless Steel Valves. You'll find in it the patterns you want, in a choice of alloys that satisfy the requirements of practically all corrosive services. Also, you'll see that these Jenkins valves meet valve industry specifications and the high standards established by the leading users of stainless steel valves. Jenkins Bros., 100 Park Avenue, New York 17.



WHEEL of high strength malleable iron designed for firm grip and easy operation.

YOKE BUSHING, easily renewable. Made of bronze, for ideal thread engagement with stainless steel spindle, to prevent seizing or galling of spindle threads. Bushing of stainless steel is optional.

SPINDLE has long thread bearing surfaces with correct lead for easy, tight closing. Screws into wedge carrier, then secured by a stainless steel pin.

YOKE BONNET has liberal space between yoke arms for easy access to packing box. Precision machined flange face assures uniform contact with gasket for a tight body-bonnet joint.

GLAND consists of two pieces — gland flange and gland follower — eliminates binding of follower in case gland bolts are tightened unevenly.

PACKING of Chevron-type Teflon in large packing box prevents leakage. Only a minimum load is required on gland, extending service life of packing.

WEDGE CARRIER connects wedge to spindle and raises or lowers it. Husky in size to stand any operating strains.

SPLIT WEDGE is the ball-and-socket design which automatically adjusts to the tapered seating surfaces for positive shutoff. The discs, revolving freely in the wedge carrier, produce a self-cleaning action on seating surfaces and reduce possibility of galling and seizing.

BODY —Through-port design for full, free flow. Ample wall thickness and good design provide extra strength to withstand stresses. End flanges conform to M.S.S. specs.

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NEW PLANT CONSTRUCTION —advance information on location, costs

Bessemer, Ala.—W. S. Dickey Clay Manufacturing Co., Commerce Trust Building, Kansas City, Mo., manufacturers of vitrified clay products, plans to construct a clay pipe plant on large building site here. New facility, when completed in late 1960, will replace the company's Birmingham plant built in 1919, and will cost about $4.2 million.

Magnolia, Ark.—Arkansas Louisiana Chemical Corp., Shreveport, La., newly formed wholly owned subsidiary of Arkansas Louisiana Gas Co., plans an expansion program at its Columbia Products extraction plant, located near here. Program will provide for ethane recovery facilities and allied equipment to increase recovery capacity of such natural gas liquids as propane, butane, isolutane, isopentane and neutral gasoline. Work is already under way on the expansion program reported to cost approximately $3 million.

Wilmington, Calif.—Turco Products, Inc., cleaners and compounds, 61st and S. Central Ave., Los Angeles, Calif., plans to construct a headquarters plant on large tract of land, here. Project, scheduled for completion in late 1959, consists of an administration building, a research center and an engineering service building.

New Haven, Conn.—Olin Mathieson Chemical Corp., Mathieson Building, Baltimore, Md., plans to construct a metallurgical research center on large tract of land recently acquired for the purpose. New facility will combine laboratory facilities with an integrated pilot production plant which is scheduled for completion late this year. Project will cost approximately $4 million.

Springdale, Conn.—Polymer Industries, Inc., a subsidiary of Philip Morris, Poplar St., this city, plans expansion which will more than double company's present manufacturing, laboratory and office facilities. Plans call for the addition of 12,000 sq ft of manufacturing area and approximately 8500 sq ft of laboratory and office space. Work is scheduled for completion by late 1959 or early 1960 at a reported cost in excess of $360,000.

Tifton, Ga.—Peerless Woolen Mills, Rossville, Ga., a member of the Burlington Industries, will build a manufacturing plant on large site here. New plant will be a modern, air-conditioned one-story structure of brick and concrete, incorporating the latest developments in textile plant engineering. Plant will be completed in the spring of 1960.

Berkeley, Ill.—Webcor Inc., 5610 W. Bloomingdale Ave., Chicago, Ill., plans construction of new one-story, brick, stone and glass walled exterior manufacturing plant and office building on Wolf and St. Charles Rd., this city. Main facility will cover an area of more than 500,000 sq ft. Work is already under way for completion by early 1960 at a reported cost of approximately $6 million. Sumner-Sollitt Co., 307 N. Michigan Ave., Chicago, Ill., has been awarded the construction contract.

Columbus, Ind.—Hamilton Manufacturing Co., manufacturers of metal chairs, stools, tables and juvenile furniture, has announced a major expansion program of company's manufacturing facilities here. New expansion will cost an estimated $2.5 million. Additions will include larger plant and office space, and the purchase of new production equipment. Work on the plant addition is already under way for completion later this year. The balance of the program to be completed over a two year period will give the plant a total of 652,528 sq ft of floor space.

Michigan City, Ind.—Clark Equipment Company, Buchanan, Mich., plans to construct a plant here for the manufacture of truck trailers, cargo-van bodies and shipping containers. Work under the direction of the Austin Co., 510 N. Dearborn St., Chicago, Ill., will represent capital investment of more than $1 million.

Warsaw, Ind.—R. R. Donnelly & Sons, 350 E. Cermak St., Chicago, Ill., printers, binders and engravers, plan to construct a printing plant here. Plant will be a one-story concrete structure with a floor area of 51,800 sq ft. Work is already under way on the project scheduled for completion in 1960. Cost reported to be about $1 million. Sollitt Construction Co., 301 Columbia St., South Bend, Ind., has been awarded the construction contract.

Cherokee, Iowa—Walnut Groves Products Co., Inc., Atlantic, Iowa, producers of live stock remedies, mineral mixtures, etc., plans to construct a feed plant on large site here. Plant will have an initial capacity of 40,000 tons of feed supplements annually. Work is scheduled for completion late in 1959. Cost of project reported to be about $600,000.

Weston, Mich.—Anderson Chemical Co., Inc., Macon, Ga., plans to expand both the manufacturing and laboratory facilities at local plant here. Project which will represent an investment of $200,000 will be launched by Stauffer Chemical Company's engineering department.

Minneapolis, Minn.—General Mills Inc., 400 Second Ave., S. Minneapolis, Minn., plans to construct a multi-million dollar research center in Golden Valley, just west of here. New facility to be erected on a 112-acre plot will contain total floor area of approximately 360,000 sq ft. It will be built in five steps with the completion of the entire center targeted for sometime in 1964 or 1965. The first section is scheduled to be ready about June of 1960.

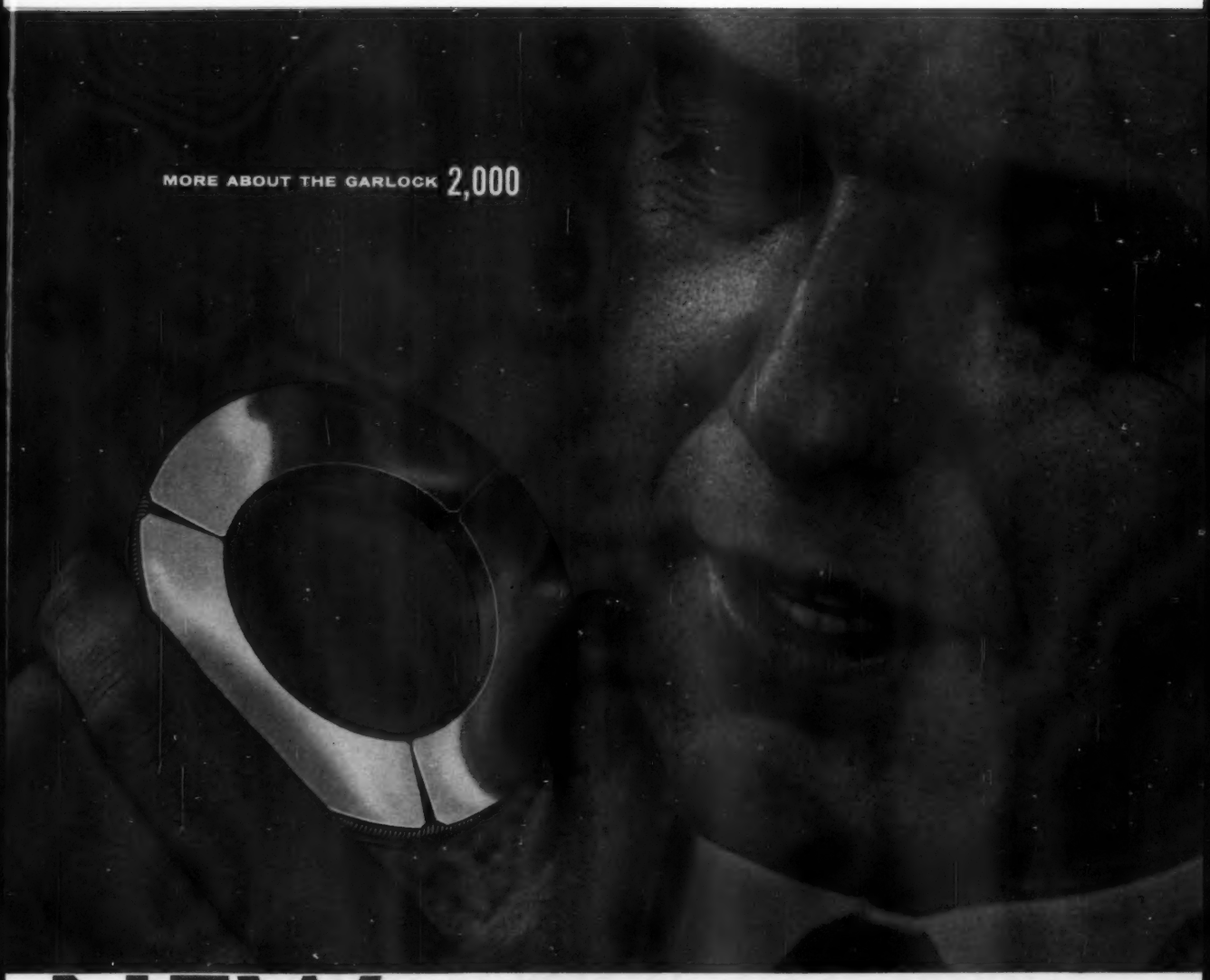
Carteret, N. J.—Continental Can Co., Inc., 100 E. 42nd St., New York, N. Y., plans to construct a plant here for the manufacture of fibre drums. Company has secured a 15-acre industrial site for the facility which will have a floor area of about 175,000 sq ft. Plant is scheduled to be completed by late 1959 or early 1960. Cost reported to be in excess of $2 million.

Edgewater, N. J.—Allied Chemical & Dye Corporation's Barrett Division, 40 Rector St., New York 6, N. Y., plans to construct a calcining plant here, to facilitate the manufacture of gypsum board. Plant, to be fully automatic, will be built adjacent to company's present gypsum facilities on the Hudson River.

Elizabeth, N. J.—Reichhold Chemicals, Inc., 523 N. Broadway, White Plains, N. Y., plans to construct a $5 million dollar plant capable of producing 30 million lb of phthalic anhydride annually at plant location here. New plant is scheduled to start production late in 1959 and will be designed for quick expansion to an annual output of about 50 million lbs.

Somerville, N. J.—Radio Corporation of America, 30 Rockefeller Plaza, New York 20, N. Y., plans to construct a 90,000-sq ft extension of company's semi-conductor and materials division located here. Construction of the new addition, already under way, will provide additional air-conditioned laboratory space for equipment development and other engineering activities. Plant will be completed by mid-1959 at a cost in excess of $1 million and will give this plant a total of 270,000 sq ft of floor area.

Youngstown, O.—Youngstown Sheet & Tube Co., has announced future plans for the revamping of company's Campbell plant in a two-year program which will cost more than $50 million. Eight units or buildings will be either dismantled or relocated during the alteration. Five new buildings with five acres of floor space will be erected: a new slab yard building; a roll and bearing shop; mill building extension; motor room extension; and slab yard extension. Three new slab heating furnaces will be installed along with a new roughing section and a new crop shear. Work will get under way soon for completion by late 1960.



NEW "MIRROR-FINISH" ON GARLOCK METAL PACKINGS

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Floating Metal Packing Sets are designed for use on reciprocating rods of air and gas compressors; steam and gas engines. Available in either solid cup or split-case design. Solid cup design (illustrated at right) withstands pressures to 30,000 psi.

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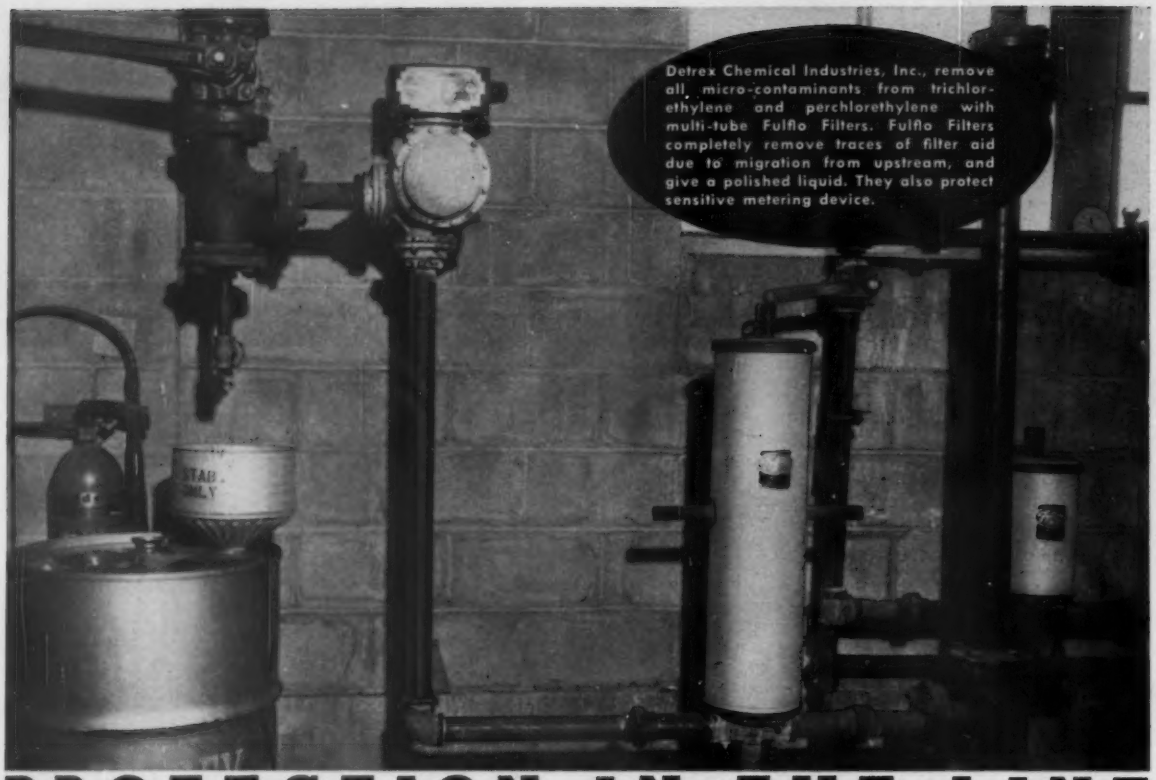
Detrex Chemical Industries, Inc., remove all micro-contaminants from trichlorethylene and perchlorethylene with multi-tube Fulflo Filters. Fulflo Filters completely remove traces of filter aid due to migration from upstream, and give a polished liquid. They also protect sensitive metering device.

PROTECTION IN THE LINE

Detrex assures product quality — protects instruments with Fulflo Filters

To maintain rigid quality standards, Detrex installs Fulflo Filters in line at final packaging in drums of trichlorethylene and perchlorethylene. Fulflo Filters assure micro-clarity of the final product by removing all impurities. Fulflo Filters also protect the sensitive instrument used to meter the final product. This means definite savings in maintenance costs.

These Fulflo Filters have been in use at Detrex for over five years, with excellent results in product clarity, equipment protection, and reduced maintenance costs.

Fulflo Filters, with genuine Honeycomb Filter Tubes, provide continuous micro-clarity for all types of industrial fluids — chemicals, oils, liquid fuels, compressed air, water and many others. Models are available for high or low flow rate, pressure, *p*H, viscosity, and temperature.

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New Alcoa "Alumalure"...
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No more drab buildings now that new Alcoa® Alumalure is here. Alumalure* introduces color for aluminum-clad buildings at remarkably low cost! Alumalure adds the showplace appeal of 11 standard baked enamel colors to all the traditional advantages of building with aluminum—light weight, corrosion resistance, economy. It has endless possibilities. You can specify Alcoa Alumalure now for plants, schools, shopping centers and many other building types. Build a showplace at low cost. Contact your nearest Alcoa sales office today for complete information!

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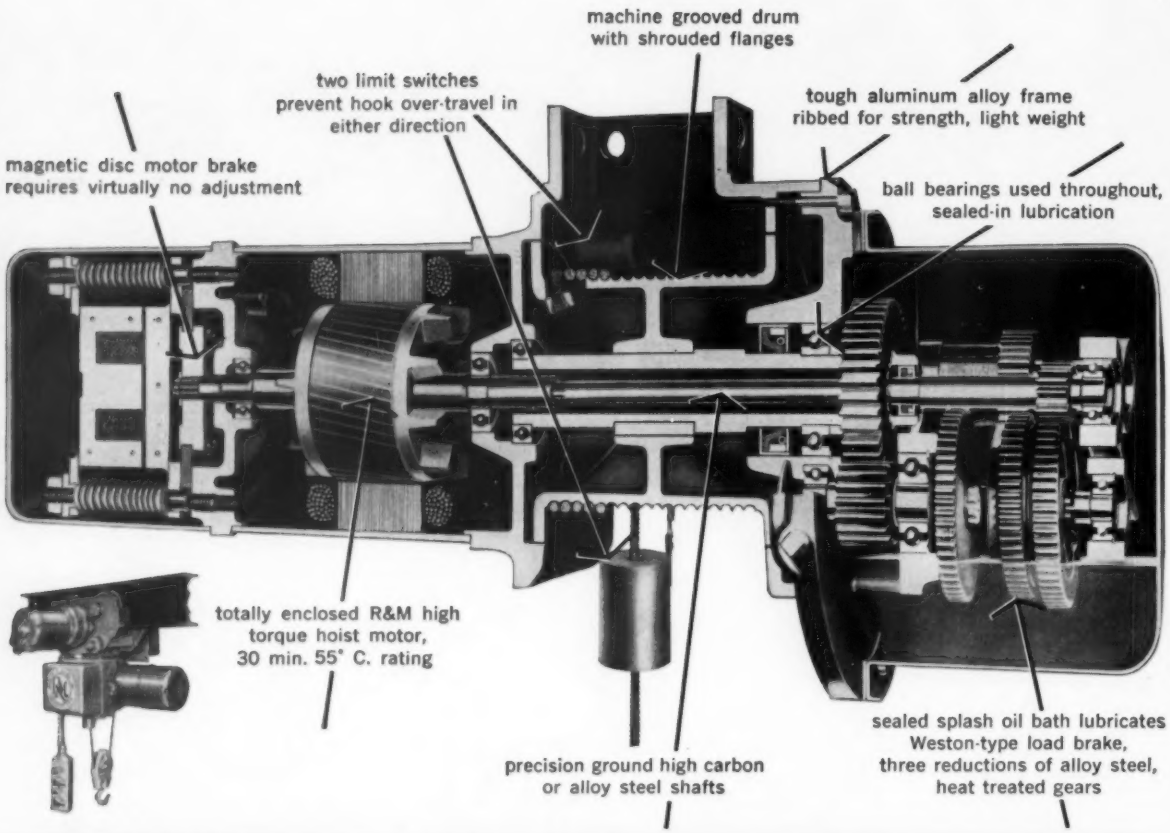

all new! hoist you'd build

R&M Type J hoists, now redesigned, give you the same quality engineering features *throughout* the line that have made Robbins & Myers hoists tops in industrial value. In the low price field the new Type J hoist features a trouble-free disc type motor brake for driftless spotting, and a sturdy Weston-type load brake. Upper and lower jam-proof limit switches, three gear reductions, and liberal use of ball bearings insure reliability. Robbins & Myers hoist motor has the highest time rating found in any low cost hoist—30 min., 55° C. This is the way you'd build it; the price is right, too.

Capacities: ¼, ½, 1, and 2 tons. Lug mounting and push-button control are standard. Push, hand geared, and motor driven trolleys available.

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Specify Westinghouse Tubeaxial Fans complete with motor and V-Belt Drive ready for "in-line" mounting in duct or stack

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J-80641

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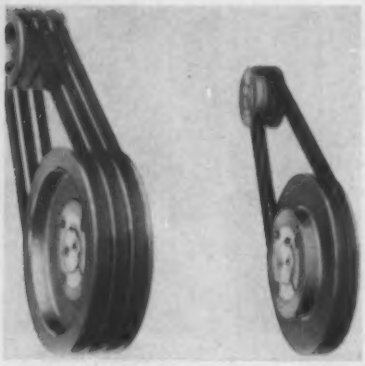
NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 177-178.

1—V-BELT DRIVES offer savings in space, weight, costs

V-belt drives in the Dyna-V line are announced as featuring smaller and lighter sheaves and V-belts of higher capacity at substantially lower cost. They cover horsepower capacities available in conventional drives. A Dyna-V drive is shown at right, with conventional drive. Savings in space,



weight and cost are attributed to development of stronger metals for sheaves, and synthetic rubbers and fibers for belts. It is noted that with the Dyna-V line, most industrial drives can be handled with belts only ⅜ in. wide, and sheaves reduced in both width and outside diameter. Besides space saving advantages, these smaller and lighter sheaves also tend to prolong bearing life.

Dyna-V Drives come in two standard groove sizes to meet all except largest industrial requirements. Besides the ⅜-in. (nominal top width) size, 3V, company offers a 5V, or ⅝-in. size, for higher horsepowers. Sheaves in the 3V services, from one to 10 grooves, are for drives from 1 to 50 hp. The 5V sheaves take from three to 10 of the ⅝-in. belts, and handle drives to 200 hp. An 8V series of made-to-order sheaves and 1-in. belts serves requirements to 1500 hp. Taper-Lock bushings are used on Dyna-V sheaves. Dyna-V belts are claimed exceptionally resistant to stretching. Dodge Mfg. Corp.

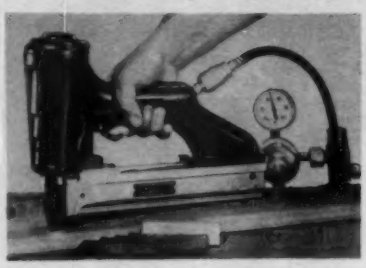
2—SAFETY LADDER of strong, reinforced plastic

According to manufacturer, this ladder is fire-resistant, extra strong and almost indestructible, and incorporates every known safety feature. It is constructed of Hetron polyester resin reinforced with fiberglass and features a method of locking in the rungs which precludes their loosening or pulling away from the siderails. It is also said to contain no materials that conduct electricity. The rungs are rough surfaced to prevent slipping and siderails are non-splintering and designed for easy gripping. The plastic ladder is described as inherently impervious to exposure, rot and corrosion, warping, splitting and moisture absorption. Company says it is unaffected by boring insects and under normal conditions should last indefinitely, even when stored outdoors. American Allsafe Co., Inc.

3—DUCT INSULATION has incombustible facing

This incombustible duct insulation is designed to provide a vapor barrier meeting "fireproof" building requirements and also to present an attractive appearance on exposed ducts without extra finishing. Of spun mineral wool, this insulation is faced on one side with embossed aluminum foil, 0.0025 in. thick. Besides being attractive, this facing also acts as a vapor barrier where condensation is a problem in the insulation of heating

and air conditioning ducts. The insulation comes in 24-by-48 in. semi-rigid sheets, 1, 1½ and 2 in. thick. Having a density of only 7 lb per cubic foot it is light in weight, easily handled and can be cut with a knife to conform to curved and irregular surfaces. It is designed to withstand 250 F. Baldwin-Hill Co.



4—AIR-POWERED GUN drives brads faster

The Duo-Fast Brad Gun is an air-powered tool reported to drive brads four times faster than by hand methods. It operates at 40 to 80 psi, depending on the job, and is designed for driving 1- and 1-¼-in. Duo-Fast cohered brads into hard materials at pressures as low as 50 lb. This high driving power at low pressures is attributed to the tool's air piston design which also serves to increase efficiency by eliminating recoil during operation. Made primarily of magnesium, the gun weighs about 5 lb.; it holds 100 cohered brads which are front loaded. It features a safety yoke which acts to prevent firing except into the material being worked on, and also serves as an automatic trip device. Fastener Corp.

5—PROCESS TIMER signals each step of operation

Advantages of automatic control are brought to manual operations with the Timeter, according to manufacturer. The Timeter is used where a sequence of timed steps must be performed by an operator. A red light or a bell signals operator each time he is needed at a process. The light stays on until it has been re-set, starting to time the next step. Steps to be timed may be of unequal duration, and the timing program is adjustable. The Timeter may be mounted on machinery or nearby. It is available to cover a range of process. Standard time ranges are 1, 2 and 3 hr. Bildwell Products.

6—BRAZED WIRE CLOTH withstands vibration

This industrial wire cloth is brazed after weaving to prevent shifting of wires in installations where the material is subjected to severe vibration. The specification now being produced is 8-by-8 mesh woven from 0.020-in.

J-50641
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Surprising savings for this power plant with Crane bronze throttling valves

At least once a year, this power plant of a leading machine tool builder was replacing the valves in the ½-inch continuous blowdown lines on its 60,000-pound boiler.

They were high-priced valves, but they couldn't take the continual throttling service. The seats cut out rapidly . . . blowdown regulation was lost . . . valve costs kept rising.

Thirty-one months ago this plant replaced the short-lived valves with Crane No. 212P, 200-pound bronze globe valves with plug type disc. Most of the time these Crane valves have been operating at less than half-open.

Yet, at every inspection to date, they've been found O.K.—no seat damage . . . no loss of regulation . . . no maintenance needed. Another proof of the economy of Crane quality!

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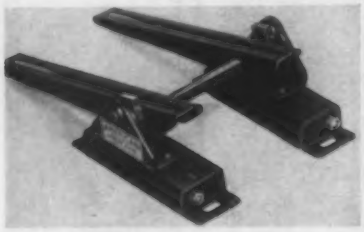
NEW PRODUCTS

(Begins on page 144)

diam stainless steel wire, and the cloth is copper brazed at each intersection. The brazed joints serve to provide a rigid structure that blocks the shifting of the wire in any direction. The Cambridge Wire Cloth Co.

7—MOTOR BASES handle up to 100-hp drives

Three new sizes of Econ-O-Matic Motor Bases are for NEMA frame motors through 100 hp. (Previously 30-hp was the largest size motor that could be mounted on these automatic bases.) The all-steel mountings are



designed to automatically control belt tension and eliminate belt slippage and speed losses at peak loads. They consist of a cradle-type motor base supported on built-in slide rails with screw take-up. There is also a simple lateral adjustment for belt alignment. The three motor bases take NEMA frame sizes to No. 405, No. 445 and No. 505. The American Pulley Co.

8—WELDING GOGGLE has vinyl plastic slides

For welding and chipping, this soft-side goggle has a frame of soft but durable and flame-resistant vinyl plastic, light in weight and conforming

to the face. The eye piece adapter is molded of more rigid plastic material which permits raising of both eye pieces as a unit without disturbing prescription glasses worn underneath. A cover lens serves to protect the 50 mm green filter lenses, available in shades 3 to 6 for welding use. Substituting the cover and filter lenses with hardened lenses adapts the goggles for chipping and grinding applications. Air Reduction Sales Co., Air Reduction Co., Inc.

9—GREASE resists liquid fuels and solvents

According to manufacturer, this grease permits normal lubrication of pumps, bearings and sliding surfaces that must work in the presence of solvents and liquid fuels. It is claimed resistant to most fuels and solvents and impervious to washing action of a wide range of petroleum, coal tar and chlorinated liquids. Pennsylvania Refining Co.

10—DIRECTED HEAT for indoor or outdoor areas

Thermal-Raye is announced as an economical way of heating loading platforms and other outdoor areas by directing heat so that it hits the desired spot or target—it heats like the sun with infra-red rays and resembles a fluorescent lighting fixture, except that it has a silica heating element that is 98 per cent transparent to infra-red. Rays are aimed or directed by means of a semiparabolic reflector. It is pointed out Thermal-Raye radiation passes through space and does not transform into heat until it strikes and object or body, and its, infra-red rays can pass through cold air without appreciable loss of heat energy. It may be used indoors, too, for warehouses, lofts, etc. Thermal-Raye installs wherever the fixture can be suspended from the ceiling or mounted on a wall. It comes as a 110-v unit which can be wired for plug-in, and in 230-v units to be wired for direct connection. Thermal Aire, Inc.

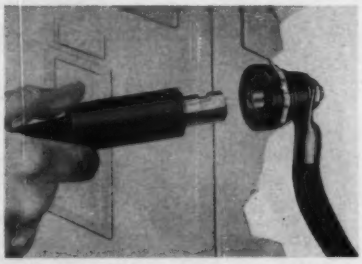
11—DOCK RAMP with automatic leveling feature

Model TM-68-LL Mechanical Dock is described as an automatic dock leveling ramp with built-in "homing instinct." Operated and counter-balanced by a parallelogram spring and cam mechanism, the ramp platform is claimed to return and lock, instantly, to a horizontal level with the surrounding dock area when not in use. Its 20,000-lb capacity rating applies both to roll-over traffic between dock and carrier and to cross-over travel when the ramp locks horizontally to become an integral parts of the surrounding dock space.

The ramp platform measures 6-by-8 ft including a slanted 14-in. lip section, which moves through a 27-in. arc (15 in. up, 12 in. downward from horizontal). Flexible hinge connection to dock lets the platform tilt sidewise to 4 in., left or right. Bumper bars on each side of the ramp are swivel connected, designed to actuate the mechanism even if the carrier backs up slightly aslant. Initial contact to the bumper bars cause platform to rise to full height, then pause momentarily to let carrier bed move underneath the lip edge. The ramp then descends to the carrier and "rides" during variations in carrier level until the loading is completed. Globe Hoist Co.

12—PANEL RECEPTACLE of high-impact plastic

Manufacturer announces that because this receptacle is self-contained and self-insulated, it can be mounted, without further insulation, on electrical distribution cubicles, switchgear, junction boxes, bus duct, wireway etc. to produce an economical "dead front" connection. The high-impact

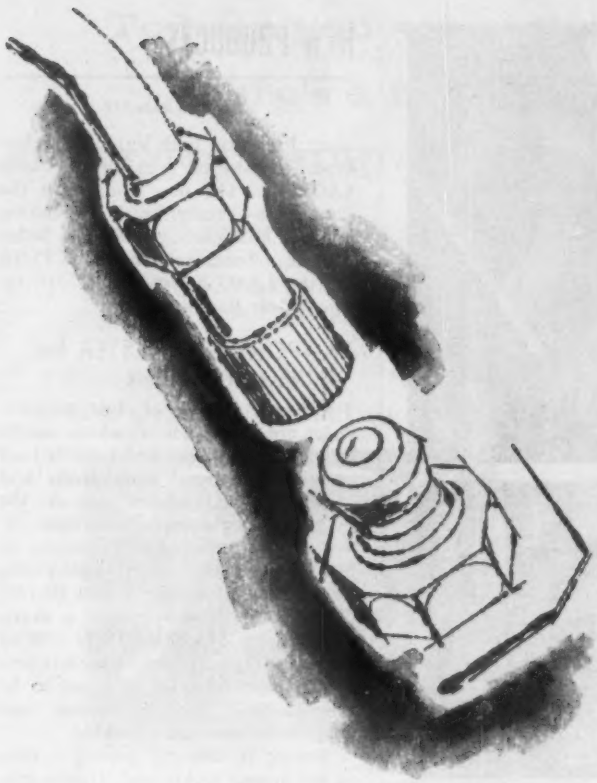


plastic insulation is claimed to provide shockproof panel mounting, prevent short circuiting of equipment.

The receptacle, with its mating plug, affords a rapid means of connecting and disconnecting power cables. The recessed copper-in-plastic design also incorporates a locking connection with a high-pressure contact, to prevent accidental uncoupling. The connection withstands a pulling force of 1000 lb, says manufacturer. No special tools or fasteners are needed for installation. After a hole is punched in the panel, the threaded plastic receptacle is inserted and tightened in place with a standard electrical conduit lock nut. The threaded copper stud is the terminal for attaching power leads. Receptables accommodate cable sizes from No. 16 to 4/0. Cam-Lok Div., Empire Products, Inc.

13—PILLOW BLOCKS with improved seals, housing

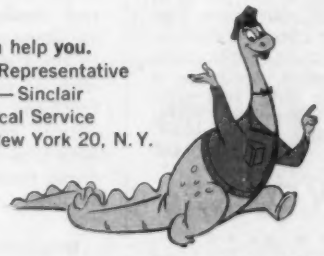
LSA (Standard) Series and LSAO (Heavy Duty) Series of relubricatable ball bearing pillow blocks feature improved seals, redesigned housing and lower prices. They incorporate integral seal bearings, and the new housing combines greater strength with an overall streamlined appear-



Machinery... lubrication... and how to save money

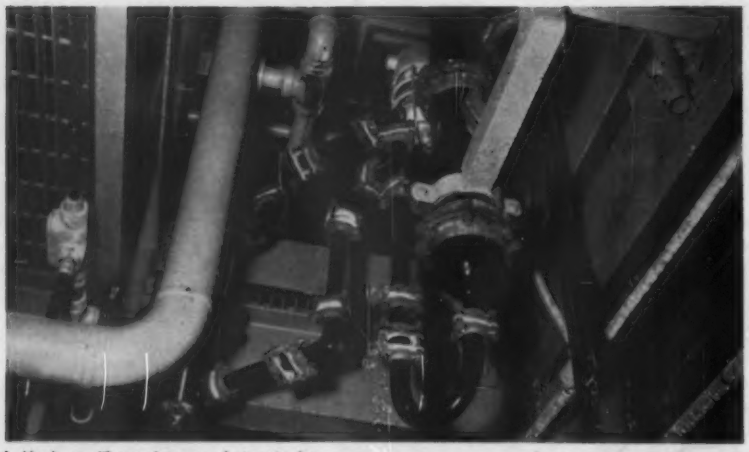
Sinclair Litholine® multi-purpose grease gives many important advantages over ordinary industrial lubricants. For example, it eliminates the need for a variety of single-use greases. Furthermore, it has earned a reputation for water resistance and high temperature performance. Change to Litholine, now. And when management asks how you've cut costs, tell them you've switched to Sinclair—and show them the results.

Find out how Litholine can help you. Call your nearest Sinclair Representative or write for free literature—Sinclair Refining Company, Technical Service Division, 600 Fifth Ave., New York 20, N.Y. There's no obligation.

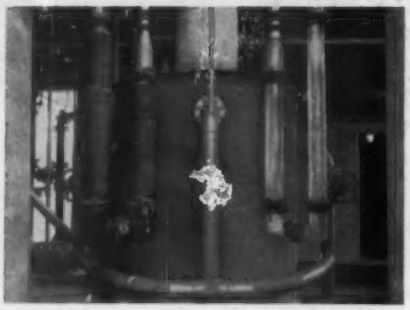


SINCLAIR
Litholine®
Multi-Purpose Grease

For more facts circle 579 on Reply Card



1. No danger of corrosion or product contamination, even with highly reactive processes, when you use PYREX Pipe. That's why you'll find PYREX Pipe handling pure bromine in Michigan Chemical's plant at El Dorado, Arkansas.



2. You can use PYREX Pipe outdoors, too, even where ambient temperatures differ widely from those of fluids handled. 3. You can keep constant visual check on flow because PYREX Pipe is transparent. This lets you see blockage, or other problems, before extensive damage is done.

A lot of bromine means a lot of glass

Michigan Chemical depends upon PYREX® Pipe to safeguard its bromine output

You would hardly attempt to make bromine in the laboratory in anything but glass—and probably glass bearing the PYREX trademark.

Naturally enough, when Michigan Chemical Corporation built its new El Dorado, Arkansas, plant, in cooperation with the Murphy Corporation, a lot of PYREX Pipe footage was installed.

Much of the glass pipe is used to deliver bromine from the Kubierschky extraction towers. The rest is used to handle hot acidified brine and ethylene bromide.

If you have ever had anything to do with the manufacture of bromine —or with any such corrosive process— you know what Mr. Clayton Carter, Plant Manager, means when he says, "PYREX Pipe is one of the few materials we have found that will withstand the extreme corrosion."

Not only is PYREX Pipe easy to keep in service—even under these rugged conditions—it is easy to *put* in service.

Your Own Men Can Install PYREX Pipe

PYREX Pipe is no more difficult to install than any other piping. For one thing, it's lighter, easier to handle, takes fewer hangers. There are no expansion joints, no lead pouring. All that is needed is a wrench and a good strong right arm. It doesn't have to be babied.

And PYREX Pipe Costs Less

PYREX Pipe is rugged. It's chemically inert. It withstands extremes of thermal shock. Add these up and you have the reasons a PYREX Pipe installation costs so little—*just because it lasts so long.*

Get the Facts

The best way to get the facts about what PYREX Pipe can do for you is to try it out yourself in your plant. Just ask us about making a test installation.

For all the facts on application, design, and installation, send for a free copy of Bulletin PE-10. Just write to Corning Glass Works, 3 Crystal Street, Corning, New York.

CORNING GLASS WORKS

CORNING MEANS RESEARCH IN GLASS

For more facts circle 580 on Reply Card

NEW PRODUCTS

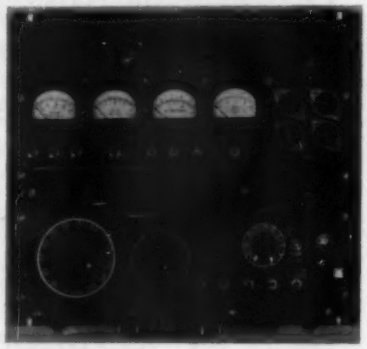
(Begins on page 141)

ance. Prices on both series are below those of company's existing SA and SAO lines. The new units have the same base-to-center-height dimension and bolt hole spacing. The LSA Series will be offered in sizes to 2-15/16 in., the LSAO Series, to 3-15/16 in. The Fafnir Bearing Co.

14—PORTABLE TESTER for thyratron tubes

Two new models of this portable tester are Model JB-3B which checks thyratrons from the 502A (2050) on up through the 3 amp sizes, and Model JB-16C which extends the range of tube testing to include 16- and 18-amp thyratrons. Tubes can be tested wherever 120-v single-phase, 60 cycles is available. Model JB-16C has a 1200 va line burden a maximum rating, Model JB-3B, a 300 va burden. An assortment of sockets permits a wide selection of tubes to be plugged into the instrument, and adaptor sockets are available.

Testing is done by placing a tube in the proper socket and, after warm-up period, the tube is put to work conducting its rated current. During



conduction it is checked for voltage drop (across the conducting gas) or arc-drop. An accumulation of arc-drop values permits operator to predict end-of-life of the thyratron. The grid is permitted to regulate the tube, and it is during this period that meter readings are taken. Values are read under steady state conditions on direct reading meters. These readings are compared to operating limits given on a tube chart to permit acceptance or rejection of thyratron. Such functions as automatic indication of critical grid volts (trigger points), automatic indication of critical grid, direct reading arc-drop voltmeter are available. Alectric Mfg. Co.

(More New Products on page 152)

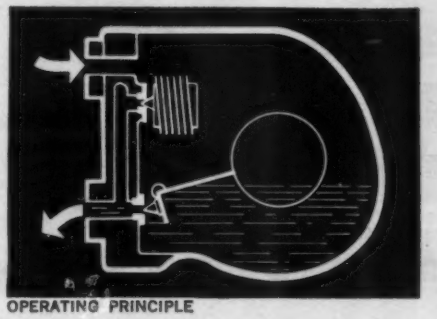
To help you select the right steam trap . . .

Here's a functional comparison of

FLOAT-THERMOSTATIC and INVERTED BUCKET types

In specifying any steam trap it is important to make certain that the type selected will do the job for which it is intended. Occasionally, the design and operation of Inverted Bucket and Float-Thermostatic steam traps are confused. Since Sarco makes both types, in addition to the three other forms of steam traps, we feel qualified to offer the comparisons which follow.

This is a FLOAT-THERMOSTATIC TRAP



OPERATING PRINCIPLE

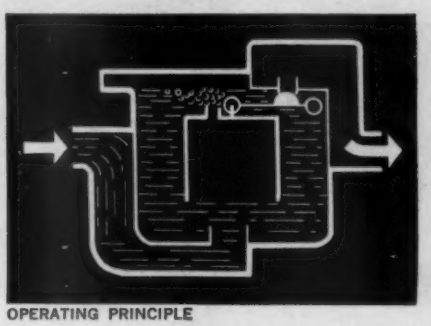
When a specifying engineer specifies a float-thermostatic steam trap, he is clearly calling for a definite, recognized, specific construction and type of operation:

1. A *sealed float* operating the condensate discharge valve; and

2. A *balanced-pressure thermostatic air vent*, controlling a separate discharge port, solely for the release of air and gases. Such an air vent fully discharges starting air and also air at temperatures approaching that of steam, regardless of pressure.

Such a trap discharges condensate continuously at a rate varying directly with the rate of steam consumption. This is why the "F & T" is first choice for applications such as unit heaters, blast heaters, air heating coils and heat exchangers.

This is an INVERTED BUCKET TRAP



OPERATING PRINCIPLE

Condensate is controlled by a valve operated by the sinking of an inverted bucket. When filled with steam or air the bucket floats in a water seal and the valve is closed. Air and/or steam escapes through a vent hole in the top of the bucket; the bucket loses buoyancy and opens the valve. Steam follows, filling the bucket, re-closing the valve.

In the inverted bucket trap (sometimes called the "open float" trap) air is discharged only after passing through the hole in the top of the bucket, then through the valve seat. A bi-metallic air vent can be fitted in the bucket, allowing freer air flow on start-up. Or the air vent may control a by-pass valve around the main valve. Either way, the vent is effective only at temperatures up to approximately 200°F.; this kind of vent is not self-adjusting for varying steam pressures. The trap closes with a bucket of steam; on each discharge, a bucketful of steam is lost.

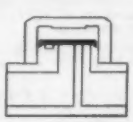
81148

On every problem that needs production planned *steam trapping, you can rely on impartial advice from Sarco, because only Sarco makes all 5 types of traps.*

Float-Thermostatic

Thermostatic

Liquid Expansion



Thermo-Dynamic®

Inverted Bucket

SARCO
COMPANY, INC.

635 Madison Avenue, New York 22, N. Y.

STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES

For more facts circle 581 on Reply Card

SAFE! DEPENDABLE!

More Light! Lower Operating Cost!

APPLETON®

MERCURY VAPOR Explosion-Proof Lighting Fixtures for Hazardous Areas

250 Watt conforms to requirements for Class 1, Groups C & D Hazardous Locations ... 400 Watt conforms to requirements for Class 1, Group D Hazardous Locations.

All these exclusive features available only with APPLETON

- Standardized Unilet Body permits a variation for mounting of fixture
- Gasket forms a positive seal between Unilet body and dome unit assembly
- Connecting Block houses recessed contact springs through which line wires are connected with screw terminals
- Collector Ring and Center Stud are energized after five full threads have been encased
- Shock Absorbing "Lamp-Lock" Socket prolongs lamp life with its resistance to shock
- Porous Metal Cylinder serves as a flame arrester and permits breathing of fixture
- "Full-Circle" Venting acts as a louver to aid in an even distribution of heat
- Heat and Impact Resisting Globe detaches itself from fixture when globe ring is unscrewed
- Cast Aluminum Guard has six sturdy braces for fixture protection
- Mercury Vapor Fixtures available for 250 and 400 watt lamp sizes

■ Enjoy 2½ times as much light with maximum protection against burn-out, and benefit from lowest possible operating cost by installing APPLETON Mercury Vapor Lighting Fixtures! Where millions of dollars in capital investments are involved in oil refineries, chemical plants, coal mines, grain elevators, paint factories and other types of businesses with hazardous areas, explosion-proof, mercury vapor lighting is worthy of the most serious consideration. In these "AA-51" Series Vented Fixtures you get all the benefits of proven APPLETON design and sturdy, vibration-proof construction resulting from years of pioneering effort. Investigate APPLETON... the complete, interchangeable line that offers the maximum in protection, as well as a full complement of accessories including mountings, reflectors, and allied equipment. Write for full details!

Mercury Vapor Lamps:
250 watt—C-H5 Clear
—D-H5 Color Corrected
400 watt—E-H1 Clear
—J-H1 Color Corrected
—S-H1 Silver White

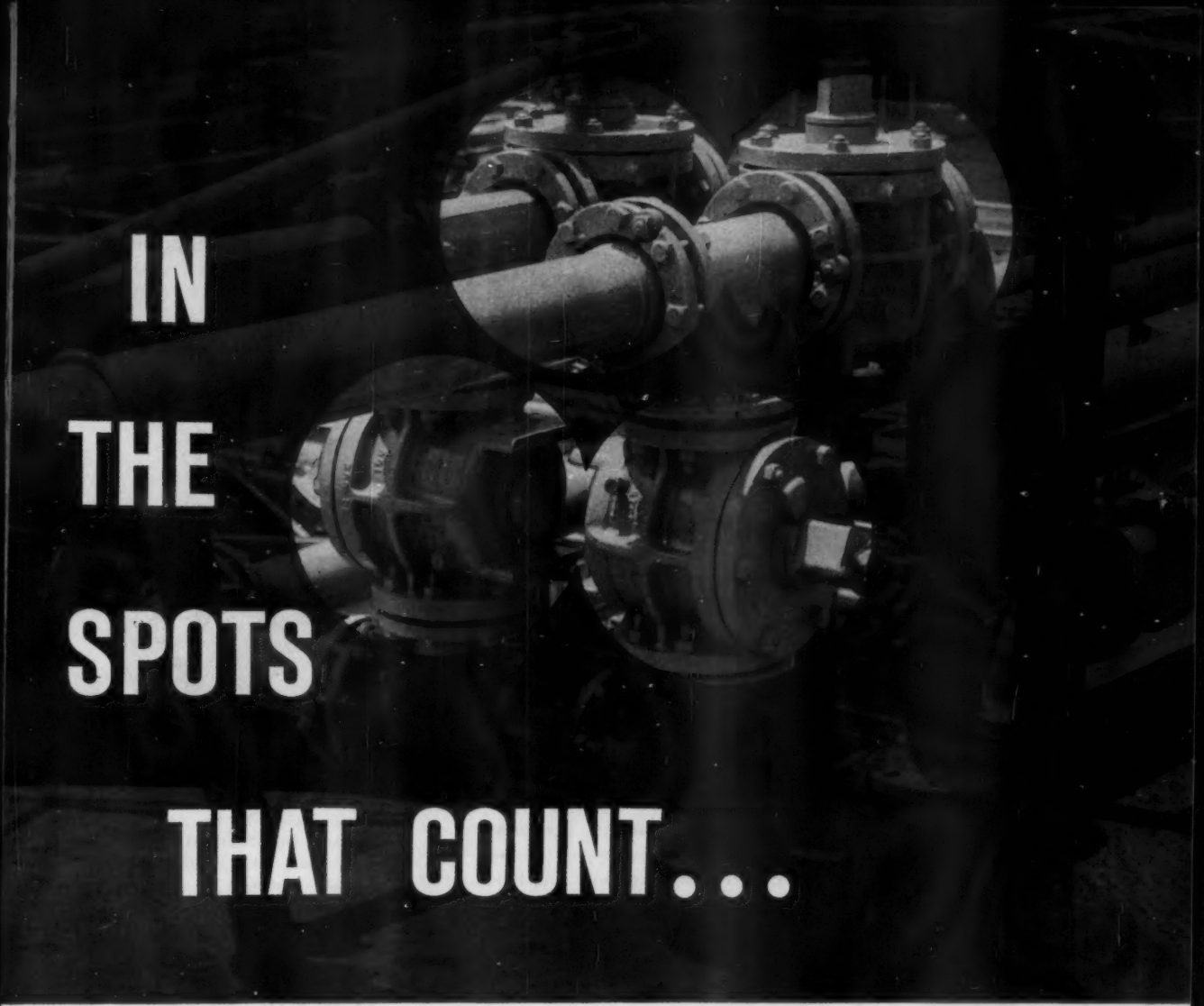
Sold Through Franchised Distributors Only

APPLETON ELECTRIC COMPANY
1701 Wellington Avenue • Chicago 13, Illinois

Additional Types of "AA-51" Series Explosion-Proof Lighting Fixtures

APPLETON ELECTRIC PRODUCTS®

For more facts circle 582 on Reply Card



Goodyear specifies Homestead Valves for non-contamination of GR-S latex rubber

Through the round ports of Homestead Lubricated Plug Valves at Goodyear Tire and Rubber Company's synthetic rubber plant in Houston, Texas, flow dilute solutions of GR-S latex rubber at 80 p.s.i. and 100° F.

Fluid solutions never lodge and build up in the line since Homestead Round Port Valves provide full circular opening through plug and body of the valve —same size as the pipe they serve.

A letter or the coupon below will bring you further information on this installation. You may also receive complete details on low first cost, low maintenance, Homestead Valves in our catalog 39-1.

Controlled pressurized lubrication plus extremely close tolerances between plug and body assure lubrication of all sealing surfaces without contamination of line fluids.

hv

HOMESTEAD VALVE MANUFACTURING COMPANY
P. O. Box 207, Coraopolis, Pennsylvania

For more facts circle 583 on Reply Card

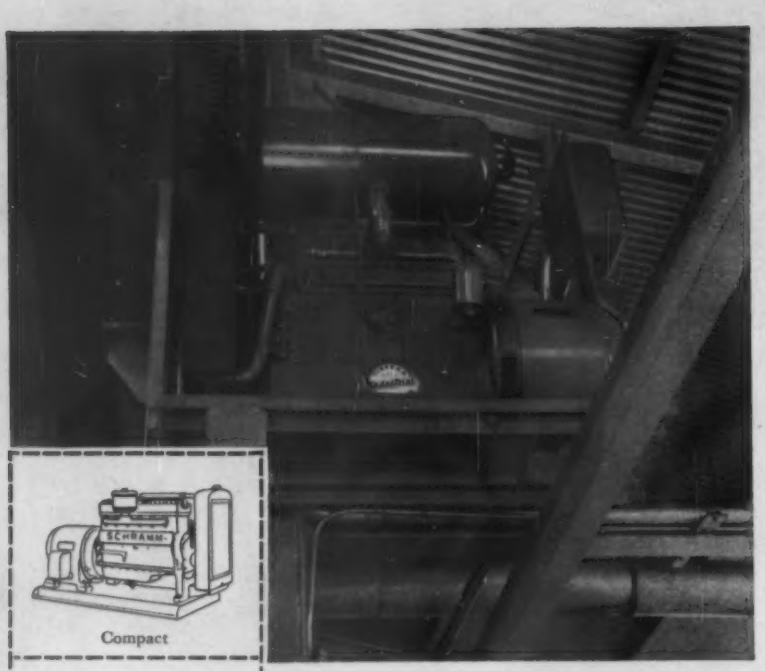
☐ Please send me catalog and prices on Homestead Lubricated Plug Valves.
☐ Send more facts about latex applications.

Name ..... Title .....

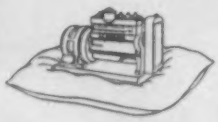
Company .....

Address .....

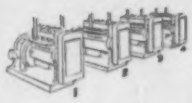
City ..... Zone ..... State .....



Compact



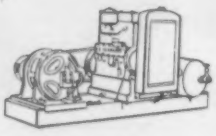
No Vibration



Unit System

No Elaborate Foundations

Easy to Move



Complete Package

COMPACT

Schramm Industrial Air Compressors Save Space

You can install Schramm Compressors *anywhere*—in minimum space—at low cost. Compact design with integral cooling system saves space every time. And you need no expensive foundations or long and costly air lines. Take advantage of unused corners for your installation. Put the compressor right on the job.

No Vibration—balanced reciprocating parts provide smooth operation, lengthen compressor life.

Unit System—no need for costly centrally located compressors and long air lines. Use only the compressors you need—add to them as requirements grow.

No Elaborate Foundations—eliminate this added cost with a vibration-free Schramm installation.

Easy to Move—change the location of your compressor whenever you need.

Complete Package—all you need for your air requirements in a single package.

For complete information, write for Catalogs GC-57 and 5510, or see your nearest Schramm Dealer.

See the Yellow Pages for local Sales, Service and Rental of Schramm Air Compressors.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. • West Chester, Pa.

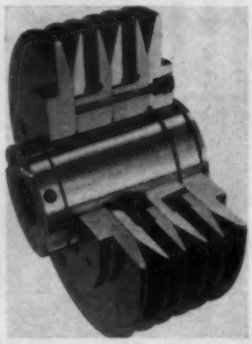
For more facts circle 584 on Reply Card

NEW PRODUCTS

(Begins on page 144)

15—SHEAVE features simplified pitch adjustment

The economical Adjustex is a simplified design, stationary control adjustable speed sheave for A, B, and C section belts in two-to four-groove construction. Pitch diameter sizes parallel company's former Vari-Pitch sheaves. One new diameter for C section belts—7.5/9.7-in. pitch diam—is available for higher speed and wider speed range applications. Design capacities to 75 hp are covered by 33 sizes. Interdigitated lug disc design is retained. Pitch diameter adjustment is made through a single adjusting screw and a hollow lock screw. Manufacturer says relative position between stationary and movable discs is maintained at all pitch diameters without disc to main sleeve set screws. Allis-Chalmers Mfg. Co.

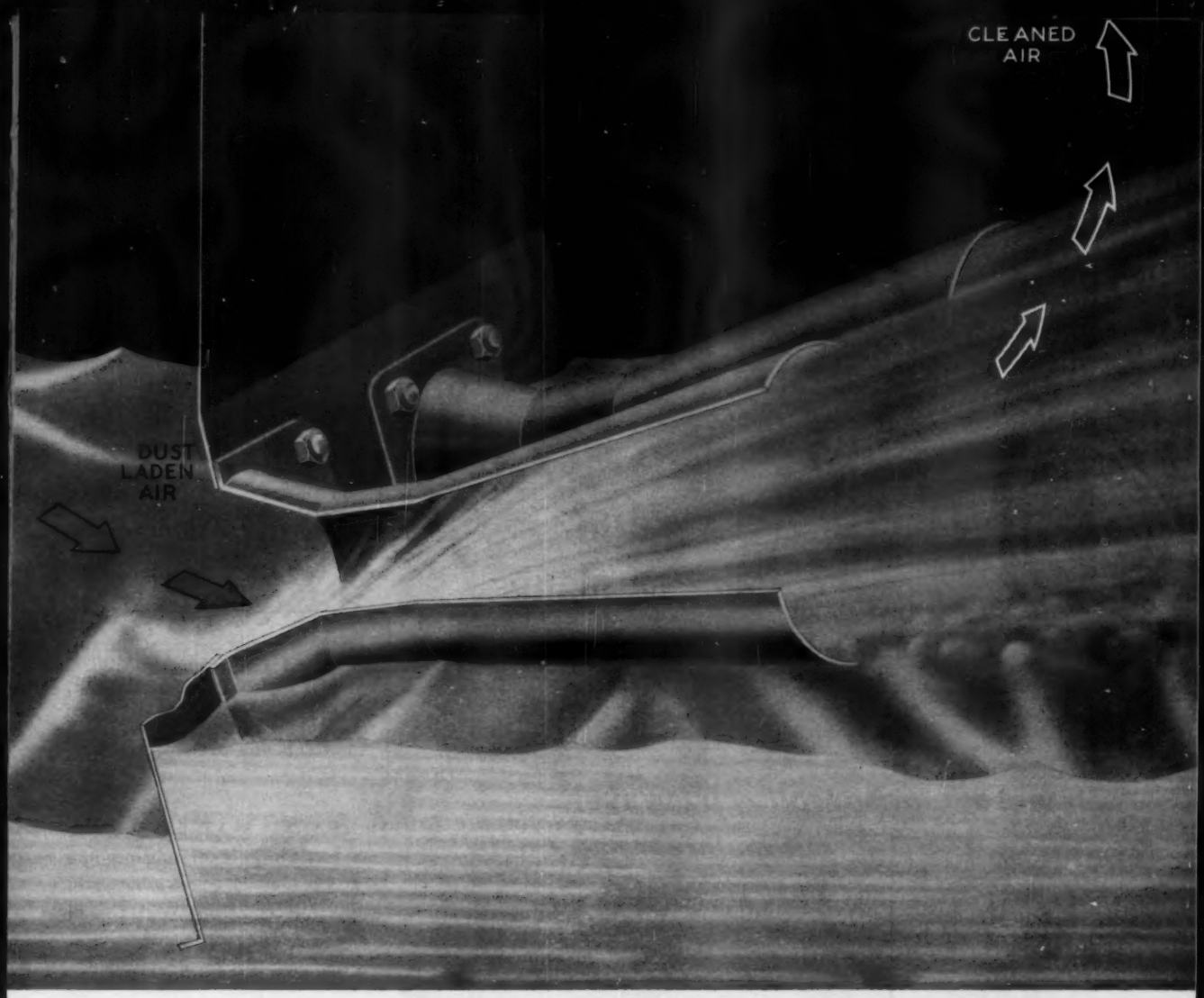


16—HIGH BAY FIXTURES for interior lighting

Type MDS Lighting Fixtures are for high-ceiling areas, particularly shops with overhead craneways. They are described as light in weight, easy to assemble and wire. These high-bay units are available for 300-1500 w incandescent or 400-w mercury lamps. They may be had with separable or single piece head, and with angle reflector for low and medium mounting heights, or with concentrating reflector for high mounting and narrow areas. Crouse-Hinds Co.

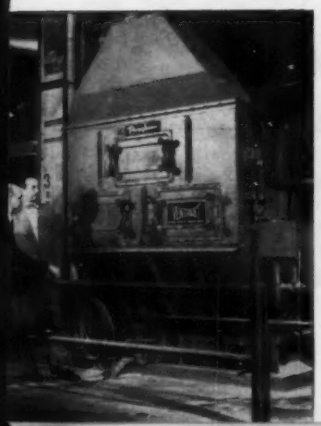
17—MULTI-FORM MEDIA improves barrel finishing

Multi-Forms are for use in tumbling barrels for precision finishing of metal, rubber and plastic parts. They are specific shapes—triangles or cylinders—of extruded or pressed abrasive grain which enable faster and better



Puts the squeeze on difficult dusts

Pangborn Ventrijet Wet Dust Collector uses exclusive venturi tubes for peak efficiency



Pangborn Ventrijet Wet Dust Collector on the job. This is just one of Pangborn's comprehensive line of wet and dry dust collectors.

That pinch-necked venturi tube is the secret behind Pangborn Ventrijet performance. As dust-laden air flows through these tubes, the constriction creates a low-pressure area which draws water into the air stream. The resulting turbulence breaks the water into particles which actually *wash* the dust from the air. The simplicity of Ventrijet design saves money in its ease of installation, its low cost of operation and maintenance.

Although the Ventrijet is particularly suited to collecting hot, moist, inflammable, corrosive and obnoxious dusts, the Pangborn engineering it typifies is important to *any* dust-producing plant. It is not enough to put a dust collector within a plant. An efficient dust control system must be *scientifically* planned, designed and constructed to handle effectively a specific dust problem. This thinking is incorporated into every Pangborn proposal.

The Pangborn Engineer in your area will be glad to go to work for you. He is a dust expert *and will discuss your individual problem at no obligation. And, for more information, write for Bulletin 922 to:* Pangborn Corp., *3200 Pangborn Blvd., Hagerstown, Md. Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn CONTROLS DUST

For more facts circle 585 on Reply Card

81.8%* of plant engineers say...

"steel enclosed trolley busways cut maintenance costs"

Flexible Feedrail systems, in capacities from 60 to 500 amperes, provide convenient movable power sources for cranes and hoists; production, conveyor assembly, and moving test lines; portable and machine tools; cutting and sewing rooms; business machines; lighting; and motor control.

Why? Because a steel enclosed trolley busway —Feedrail—delivers trouble-free power through *overhead mobile outlets that move with the load.*

You eliminate long, dragging power cords, cables and reels—as well as the cost of inspecting, maintaining and replacing them. That adds up to considerable savings in both maintenance and downtime.

More! Feedrail speeds up production, reduces accidents, protects buildings and equipment.

There's a Feedrail system that's just right for your crane or hoist, portable tools and other plant equipment. Feedrail is surprisingly easy to install, can be quickly extended or relocated —never becomes obsolete!

Find out now how Feedrail can help you lower maintenance costs in your plant. Send for Bulletin. Write Dept. P-1

*Survey was conducted among 3,036 plant engineers by an impartial organization and printed in a leading trade magazine. Write for free copy of entire survey.

SOLD BY MORE THAN 1,000 ELECTRICAL DISTRIBUTORS FROM COAST TO COAST

CH-8

ELECTRIC FEEDRAIL

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SPECIALLY QUALIFIED REPRESENTATIVES IN PRINCIPAL CITIES

For more facts circle 586 on Reply Card

NEW PRODUCTS

(Begins on page 144)

deburring and grinding. According to manufacturer, Multi-Forms give maximum surface contact, eliminate peening or rolling over of burrs, and have a longer use life. The variety of sizes offered enable selection of a form that will not lodge in the slots or holes in the work part. Multi-Forms come in two basic shapes, triangles and cylinders. Other shapes can be made. These vary as to size (side of the triangle or diameter of the cylinder) as to length (thickness of triangle or cylinder) and as to type of abrasive material and grit. Multi-Forms come in Type A, a straight aluminum oxide; Type B, a blend of aluminum oxide and silicon carbide; and Type C, silicon carbide. BMT Mfg. Corp.

Use the Reader Service Cards provided on pages 177-178 to ask for more information on these products. Circle item numbers of products in which you are interested.

18—PANEL MATERIAL affords high level lighting

Glare-free illumination is announced for this Fiberglas polarizing light panel. It utilizes reflected and refracted polarization to achieve brightness control and uniform light distribution which, it is explained, permits a high level of illumination with reflected glare controlled in the single lightweight panel that fits many standard fixtures. The new material operates on the principle of selective reflectance and diffusion. When light passes through the panel to the area below, the light is diffused into a soft, even tone. At the same time some light is reflected back into the fixture by the polarizing action of Fiberglas flake —reducing amount of light emitted from the panel in the critical or direct glare zone. The material is produced in flat, 24-by-48 in. sheets, and consists of color-stable resin reinforced with Fiberglas flake. It has a textured appearance, smooth surface. Owens-Corning Fiberglas Corp.

19—ENAMEL covers all surfaces and dries fast

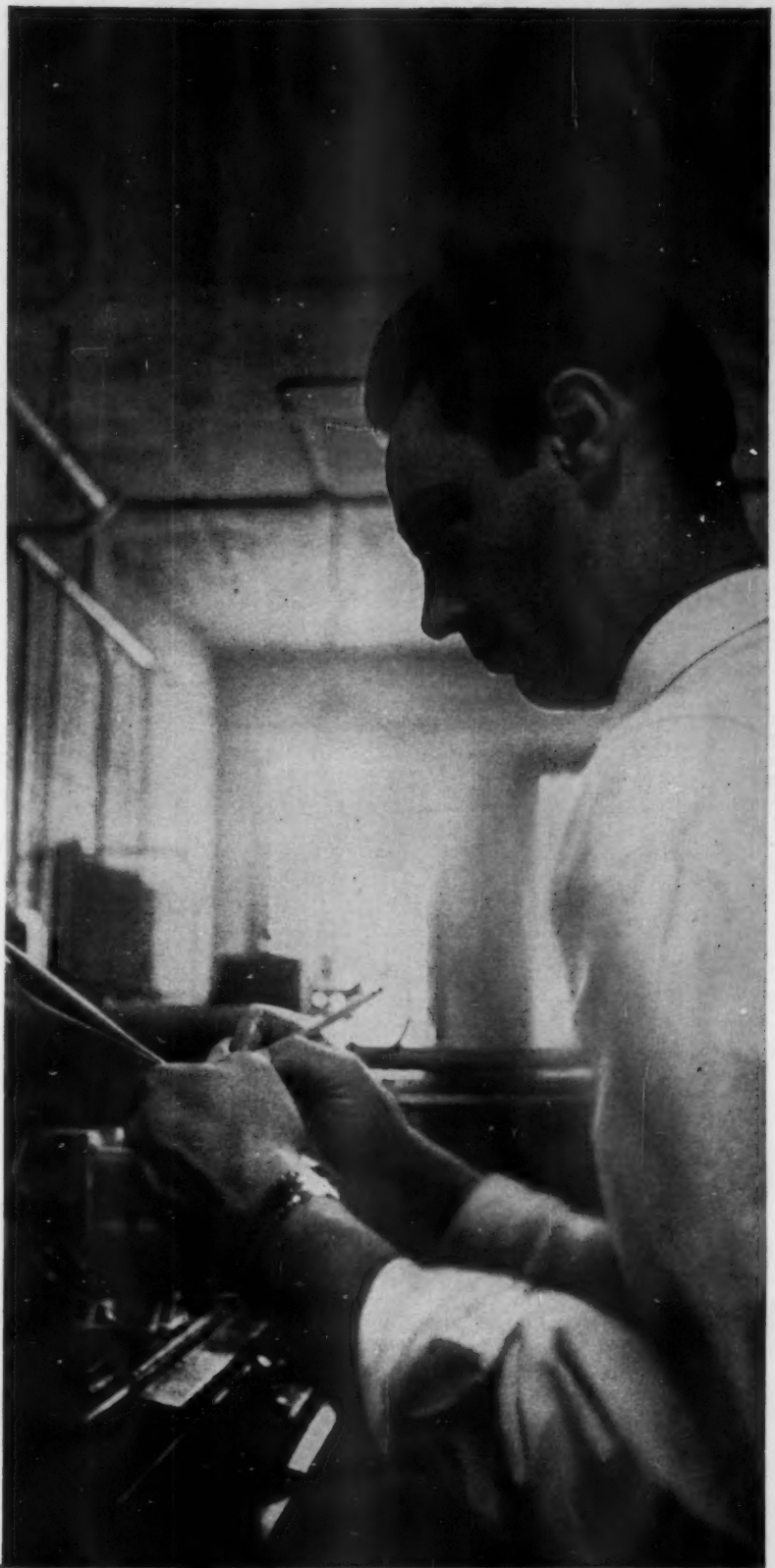
Jet-Dri is announced as a fast-drying, non-toxic, all-surface enamel that reduces on-the-job painting and maintenance costs by 28 per cent. With it, work areas can be painted and

HERE'S HOW ESSO RESEARCH CAN GO TO WORK FOR YOU

The Esso Lubrication Engineer brings to your shop the vast experience and facilities of Esso laboratories and research—as a customer service.

He offers, with a broad knowledge of fuels and lubricants, considerable experience in the maintenance of equipment like yours. For instance, he can trouble-shoot cases of rapid wear and frequent overhauls... point out instances where too much lubrication is wasteful... where too little—or the wrong kind—results in unnecessary wear. And if you have an unusual problem, he can have it analyzed in one of the conveniently located Esso Sales Service Laboratories—capable of running over 500 different kinds of petroleum product tests.

Let an Esso Lubrication Engineer help *you* cut maintenance costs. For more information, contact your nearest Esso office, or write to: Esso Standard Oil Company, 15 West 51st Street, New York 19, N.Y.



Esso

In Industry after Industry..."ESSO RESEARCH works wonders with oil"

For more facts circle 587 on Reply Card

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

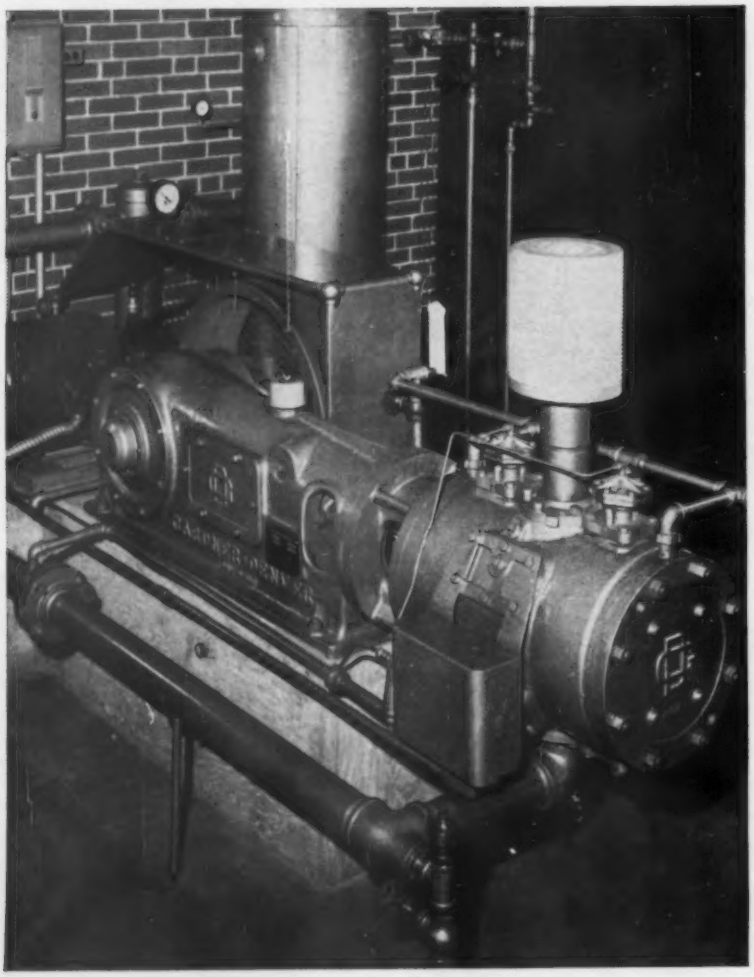
GARDNER DENVER

Pure, oil-free air for processing or instrumentation—that's what you can depend on from the Gardner-Denver CRX compressor. That's because carbon parts in the cylinder—piston, piston rings, packing rings—are made of self-lubricating carbon. No oil or water lubrication is required. Correct cylinder and valve design keeps efficiency high, power cost low. Send for Bulletin CRC-10 today and learn the details.

Stationary air compressors . . . tank-mounted compressor outfits . . . oil-free air compressors . . . whatever your compressed air needs, see your Gardner-Denver compressor specialist first. Gardner-Denver Company, Quincy, Illinois.

Pure, oil-free air

CRX Carbon Piston Compressor



NEW PRODUCTS

(Begins on page 144)

ready for use 15 minutes after the job is done, says manufacturer. Jet-Dri is claimed to produce a lustrous, baked-enamel type finish, resistant to acid, alkali, alcohol, gasoline and boiling water. Consolidated Chemical & Paint Mfg. Co., Inc.

20—SWING REACH TRUCK works in narrow aisles

The Swing Reach Transveyor projects its forks forward to "reach out" for the load and swing in unison, right or left of center, up to 30 deg. This lift truck comes in capacities of 2000, 3000 and 4000 lb. The swing feature provides the forks with a 60-deg radius, making it unnecessary to position the truck to pick up a load; the operator merely moves the forks to the right or left. Compactness of the swing reach mechanism which, when collapsed, makes the unit only 3 in. longer than the standard Transveyor model, and the load overall height of the mechanism permit greater utilization of existing storage space and higher stacking of loads. It attains a maximum lift height of 130 in. from a collapsed mast height of 83 in.

According to manufacturer, deflection is virtually eliminated in this truck through use of a horizontal double hinge design of the mechanism. A tilt device is optional but required only to cradle the load in carrying position. Reach and swing mechanism can be operated simultaneously or individually through use of one control lever. Various sizes of pallets and skids can be used with this truck, it is noted, and because base arms do not enter rack it can be used with any rack installation. Automatic Transportation Co.

21—HEAT EXCHANGER MOTOR in 25- to 300-hp

Designed to provide a wide adjustable speed range, this dpc motor is also intended for constant speed applications and comes in ratings from 25 to 300 hp. It is available in an explosion-proof enclosure (Class I Group D) for hazardous installations and with standard enclosed construction for protection against abrasive airborne particles, dirt, collants, moisture, oil vapors and other severe atmospheric conditions. It is suggested for indoor or unprotected outdoor service in the oil and chemical, cement, paper, rubber and steel industries, and for machine tool

and material handling applications.

Range of adjustable speed offered by this d-c motor extends from 5 per cent of base motor speed by armature control (constant torque) to 400 per cent of base motor speed by field control (constant horsepower). A factor in broadening this adjustable speed range and minimizing motor size is the use of an integrally mounted a-c fan motor to supply a constant flow of cooling air regardless of speed of the d-c motor. Heat exchanger tubes of heavy-section, aluminum alloy are distributed around the periphery of the field ring. The motor can be mounted floor horizontal, wall or ceiling horizontal, or vertical with shaft up or down. Bulletin 3000 gives more data. The Louis Allis Co.

22—FASTENING TOOL doesn't overshoot mark

The Flite-Chek utilizes the power of a fired cartridge for fastening into concrete and steel, and is designed to reduce the possibility of a fastener being fired through a weak spot in construction material. According to manufacturer, an objection to the use of powder-actuated tools has been the possibility that, through carelessness or other cause, a fastener might be fired into free flight. In the Flite-Chek, control of the fastener is accomplished by an assembly designed to grasp the fastener and prevent its escape—the fastener is stopped before it leaves the tool. The new tool seats a fastener into a variety of non-brittle materials. It is claimed capable of sinking a fastener into as much as 1 in. of steel and is designed for both ¼-in. threaded studs and drive pins. It cost around $150.00 Ramset Fastening System, Olin Mathieson Chemical Corp.

23—TABLE-ROOM for cleaning larger castings

This 6-ft Rotoblast Table-Room is introduced for foundries and plants requiring a flexible machine for a wide range of cleaning operations. Capable of Rotoblasting castings, forgings and stampings up to 72-in. diam by 36 in. high, and weighing up to 5000 lb, this table has a cast labyrinth abrasive sealing system to make the cabinet abrasive-tight without rubber gaskets. A single overhead Rotoblast wheel, powered by a 30-hp motor will throw 50,000 lb of abrasive per hour. A safety feature incorporated are power guard plates positioned in front of the wheel

A swift, safe lift
with non-sparking air hoist

For lifting power that's safe from fire and explosion hazards, use Gardner-Denver air hoists. Non-sparking axial-piston air motor makes these hoists ideal for jobs in chemical, gaseous or dusty atmospheres. Here, a Gardner-Denver two-ton air hoist lifts a mixing vat in a paint manufacturing plant. In addition to this vital safety feature, Gardner-Denver air hoists provide an easily controlled speed for a swift, steady lift—with gentle starts and accurate stops.

Handy air hoists in sizes from 150 lb. to 2 tons. Write for Bulletin 80.

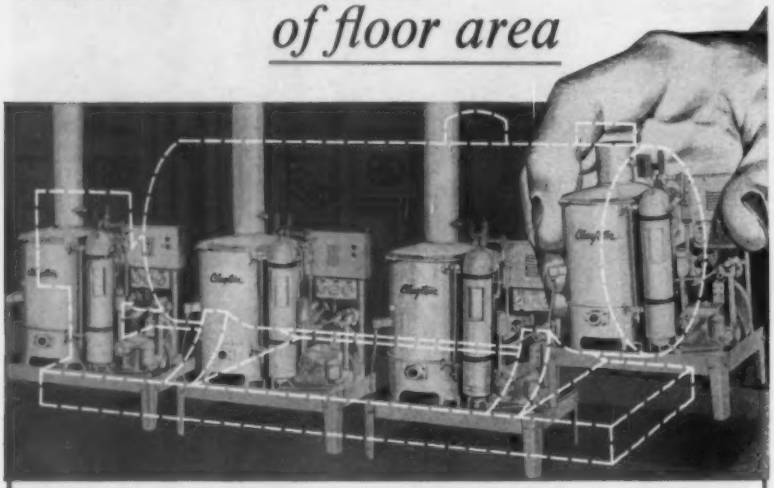
EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

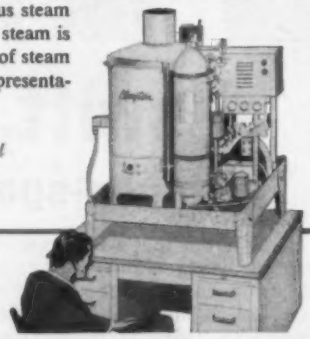
HERE'S HOW TO QUADRUPLE STEAM PRODUCTION...

without expansion of floor area



Case history after case history proves that the story is the same. More and more smart business men are specifying Clayton Steam Generators. The reasons are many. Clayton's unique principle of controlled circulation is so efficient that a Clayton requires as little as 25% of the space of an ordinary boiler. Simple to operate too. Just push a button at the start of a shift and in three minutes the unit is at operating pressure. Furthermore, an operating Clayton (full of water) delivers up to 6½ HP per square foot of floor area with as little floor load as 130 pounds per square foot. A Clayton costs less to install... no expensive rigging, stacks or high freight costs.

Compactness is due to Clayton's *controlled circulation* feature which also eliminates drums, headers and other dangerous steam storage vessels. Steam is produced only as steam is demanded... reducing greatly the amount of steam or hot water in storage. Let a Clayton representative give you more facts.



Where Steam can Serve you Clayton can Serve you Best

Clayton STEAM GENERATOR

READ THE GUARANTEE THAT COUNTS!

Compare Clayton's 5-year published coil warranty covering material and labor.

Sirs: Please send us more information on Clayton Steam Generators.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

We use steam for_____

Send to: Clayton Manufacturing Company

409 401 N. Temple City Blvd., El Monte, California

NEW PRODUCTS

(Begins on page 144)

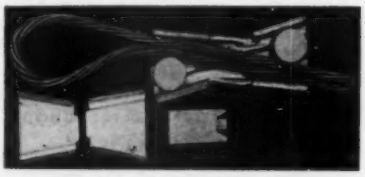
when the motor is turned off to prevent abrasive from striking the table. When the wheel is turned on again, the guard plates retract to the original position. Also, it is noted, a safety switch automatically turns off the motor and these plates go into position in front of the wheels when the doors of the Table-Room are opened. Pangborn Corp.

24—DETECTING UNIT for dial rotation

Designed for special monitoring applications, this sensitive unit is provided with an additional focusing lens for magnification. In operation every revolution of a pointer actuates a signal. It has a wide range of applications, company says, giving accurate registration on a very fine line or dot. The unit can be used also for weight control on production line because the pointer (pre-adjusted) does not pass a specific predetermined point. Improved circuitry in relay unit is designed to permit further sensitivity in setting precise thresholds of triggering in order to meet close discrimination. ESS Instrument Co.

25—WIRE, CABLE CLAMP reduces installation time

Claimed for the French Self-Locking Clamp are 30 to 50 per cent reduction in labor and installation time as compared with older types of clamps; test reports showing that it holds without slipping beyond the

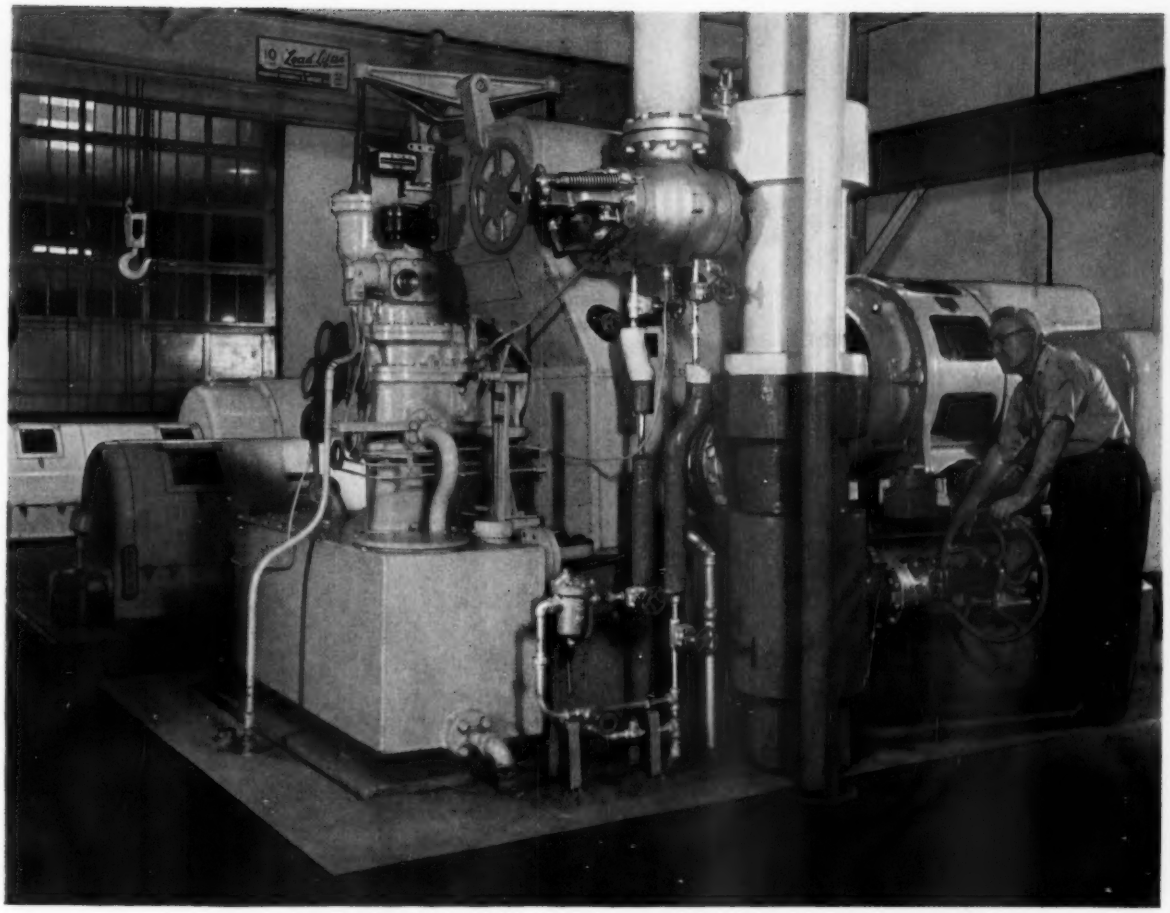


breaking strength of guy wires and cables; and performance records showing it does the work of two or three older style clamps. It has four parts: a housing with two adjustable hard steel rollers (which lock the wire or cable by friction), two clips that slide over the main body of the housing, and rollers and a safety bar that slides in between the clips to lock them. The clamp weighs only 1.2 lb and takes wires or cables 5/16, 11/32, ⅜ in. etc. It is also suggested for use with rope. Clamps, Inc.

(More New Products on page 162)

For more facts circle 590 on Reply Card

For more facts circle 591 on Reply Card →



Power plant, Downingtown Paper Company, Downingtown, Pa. Painting by Harry J. Sieck, Pottstown, Pa.

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DU PONT PAINT PLAN BOOSTS PLANT EFFICIENCY

New way to improve plant performance: Du Pont Color Conditioning! Du Pont developed it to help create ideal seeing and working conditions in every type of industrial plant. This scientific painting plan uses the power of color to raise employee morale, promote safety, boost production. Let us show you how many ways you can put this practical system to work profitably in your plant . . . at no more cost than regular maintenance painting. Just mail the coupon below for complete information.

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UNIT HEATERS

...another of the complete lines of Heating, Air Conditioning, Refrigeration and Heat Transfer products

FOR PLANT COMFORT AND EFFICIENCY

Look to *"one source—one responsibility"* . . . Dunham-Bush . . . for all your *heating* needs (as well as air conditioning, refrigeration and heat transfer products).
Yes, if it's for steam or hot water heating, Dunham-Bush supplies it! Not only unit heaters, but all the traps, vents, valves, pumps, etc. necessary for the complete heating system.
Ask for the name of your nearby Dunham-Bush sales engineer. His job is to assist you. You'll find it worthwhile, to listen to his "one source" story.

BLOWER TYPE

For heating and ventilating or heating only. 17 different sizes in 170 ratings from 125,000 to 1,500,000 BTU 1,430 to 20,800 CFM. Floor, wall, inverted wall, ceiling or platform mountings.

HORIZONTAL DISCHARGE
Propeller Fan Type

For working pressures up to 150 psi, capacities from 15,600 to 360,000 BTU. Where steam pressures are in excess of 30 pounds, Model JM with less finned surface and lower final temperatures is recommended.

VERTICAL DISCHARGE
Propeller Fan Type

Two models for working pressures up to 150 psi, capacities from 30,240 to 576,000 BTU. Four types of air diffusers available.

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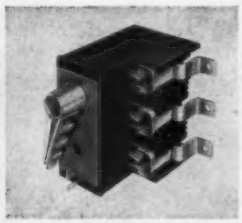
For more facts circle 592 on Reply Card

Now QMQB Fusible Switches

- **QUICK-MAKE, QUICK-BREAK**
- **30 THROUGH 1200 AMPS**
- **VISIBLE BLADE CONSTRUCTION**

FOR PANELBOARDS, SWITCHBOARDS, CONTROL CENTERS—heavy-duty design meets modern industry's increased power handling requirements—30 through 1200 amperes, 600 volts—the most complete line available! U.L. approved. For complete information on QMQB units and panelboards, write for bulletin 3-230: Federal Pacific Electric Company, General Offices: Newark, New Jersey.

VISIBLE BLADES FOR MAXIMUM SAFETY—Lets you see at a glance whether switch is "ON" or "OFF"—makes inspection easy. Silver-alloy contacts insure positive connections—reduce wattage loss.



INTEGRAL HANDLE MECHANISM FOR GREATER CONVENIENCE—handle mechanism and switch are combined in a single unit—eliminates excess linkage—prevents misalignment and false indication of switch position.

DEIONIZING ARC QUENCHERS FOR COOLER, FASTER INTERRUPTION—eliminate pitting and provide higher interrupting ability. Arc is divided, cooled, and extinguished in the quencher, rather than on the contact surfaces.

HIGH PRESSURE FUSE HOLDERS FOR LONG LIFE, RELIABLE SERVICE—grip the fuses tightly under constant spring pressure—reducing contact resistance for cooler, more efficient switch operation—even under varying loads.

LOCKING PROVISION FOR ADDED SAFETY—cover may be locked in either "ON" or "OFF" position with as many as three full-size padlocks to prevent unauthorized access. Additional provision for padlocking cover.

FEDERAL FPE PACIFIC

The Best in Electrical Distribution and Control Equipment

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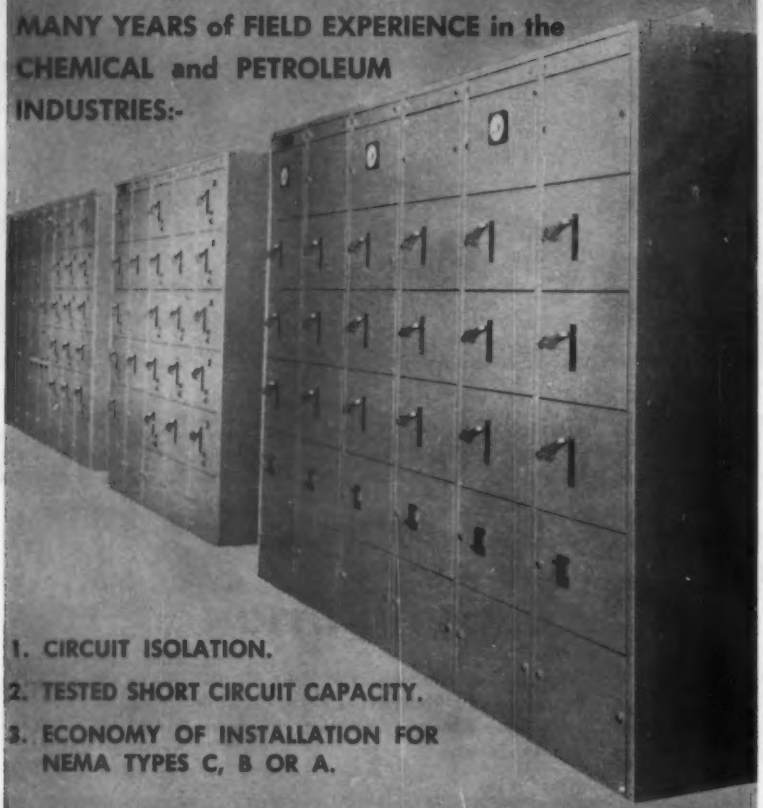
HERE *is the* ENGINEER'S CONTROL CENTER

WITH POSITIVE FEATURES THAT WERE DEVELOPED and DESIGNED INTO THIS ALL-NEW MAXIMUM PROTECTION CONTROL CENTER as the RESULT of MANY YEARS of FIELD EXPERIENCE in the CHEMICAL and PETROLEUM INDUSTRIES:-



1. CIRCUIT ISOLATION.
2. TESTED SHORT CIRCUIT CAPACITY.
3. ECONOMY OF INSTALLATION FOR NEMA TYPES C, B OR A.

MAXIMUM PROTECTION CAN ONLY BE ACHIEVED BY COMPLETE **CIRCUIT ISOLATION** PLUS TESTED SHORT CIRCUIT CAPACITY.

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NEW PRODUCTS

(Begins on page 144)

26—BOILER RETURN SYSTEM of improved design

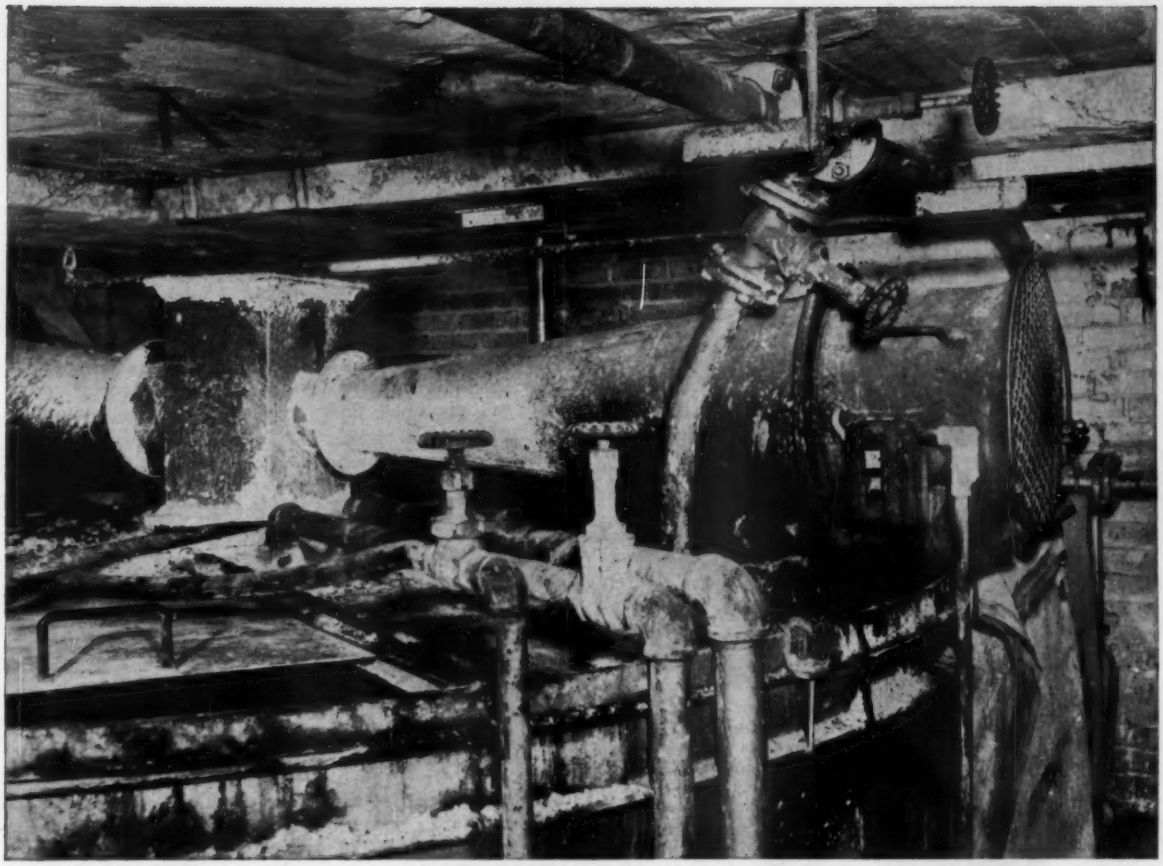
Better performance with lower operation and maintenance costs are claimed for this improved differential drainage and boiler return system. It is designed for use wherever steam is required for processing at pressures over 30 lb. Features announced include a two-stage pump to replace the dual pump arrangement formerly used, floatless liquid level control, chrome plated pump internals, and Teflon packing in differential valve.

The system is said to return condensate from steam processing units to the boiler at 300 F or higher—only 15 to 20 deg less than the temperature at operating pressure. This lowers fuel costs 10 to 25 per cent over most open systems, according to manufacturer, and raw water make-up requirements are reduced up to 90 per cent. A differential valve is provided to automatically maintain any desired differential in pressure between steam in boiler and pressure in the system's receiver tank. Since the system requires only 25 lb pressure differential, power required for pumping is reduced about 75 per cent, it is stated. Stickle Steam Specialties Co.

27—REMOVABLE COATINGS for temporary protection

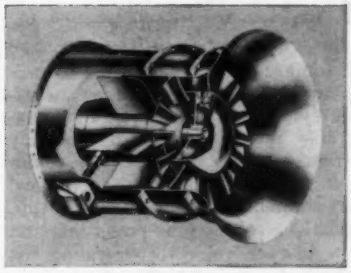
These removable plastic coatings are introduced for lowest cost temporary protection of highly finished surfaces which can be damaged during fabrication, handling and shipping. They come as liquid plastic solutions to be applied by conventional coating techniques. When dry, they form tough, abrasion-resistant films. Two general classes of coatings are available: fast-drying solvent solutions and plastic water dispersions. Depending on product used, the coatings are removed by one of four methods: peeling by hand; dissolving in a vapor degreaser; dissolving in mild alkali solution; wetting the film with water. The specific product to be used in an application is determined by degree and type of protection required, surface to be protected, operations to which the protected surface is subjected. Some of the coatings can be left on the fabricated object as a form of protective packaging, or exclusively for packaging. Guard Coatings Corp.

(More New Products on page 164)



Efficient Joy Axivane Fans vent corrosive fumes from tanks in chemical plant producing fatty acids and polyesters.

CORROSIVE ATMOSPHERE NO PROBLEM FOR THIS JOY AXIVANE® FAN



Other Bulletins also available:
Compressors 268C-80
Dust Collectors 267D-80

Joy Axivane Fans are used to vent extremely corrosive fumes in a number of electroplating and chemical plants across the land. Efficient, quiet, compact and durable Joy Axivane Fans are available in alloy steels or with special coatings to resist the most corrosive atmospheres.

Hundreds of standard models are available with either V-belt or integral drive. They are supplemented by a design service which will give you Joy Axivane Fans with whatever efficiency, capacity or pressure your installation requires.

For details write for Joy Fan Bulletin 268F-15.

Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: Joy Manufacturing Company (Canada) Limited; Galt, Ontario.

WSW 17363-268

JOY ... EQUIPMENT FOR INDUSTRIAL PLANTS ... FOR ALL INDUSTRY

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Booths 1104 and 1108
Heating and Air Conditioning Exposition

INDUSTRIAL COMPRESSORS

DUST COLLECTORS

ELECTRICAL CONNECTORS

FANS AND BLOWERS

For more facts circle 595 on Reply Card

With these 3 RIDGID®
Jam-Proof Pipe Threaders
my power drive threading is Safe...
...no watching to keep them from jamming
...save me a lot of time, too!

1" to 2" Pipe
RIDGID
65R-TC
Jam-proof—can't jam if you forget it . . . Threads 4 sizes of pipe and conduit with 1 set of dies . . . True-Centering workholder—no more crooked threads—but adjustable for drip threads. Far more for your money—compare!

2½" to 4" Pipe
RIDGID 4PJ
Jam-proof . . . drive pinion kicks out automatically—real safety when power threading. Workholder sets to size before putting on pipe. Other exclusive advantages. Special 4PJ for conduit.

4" to 6" Pipe . . . RIDGID 161
Jam-proof for safe power threading. 1 set of dies threads 4", 4½", 5" and 6" pipe and conduit—sets to size fast. Workholder sets to size before putting on pipe, a work-saver feature. Many other reasons why the 161 is your best buy!

See and try these popular RIDGID Threaders . . . at your Supply House.

THREADED PIPE . . . It's Tight . . . It's Best . . . Costs Less!
For more facts circle 596 on Reply Card

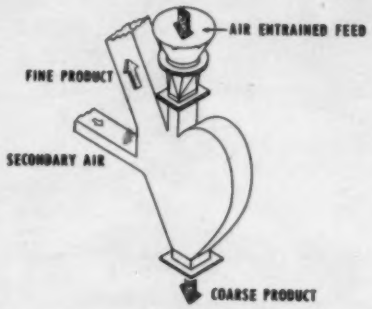
NEW PRODUCTS

(Begins on page 144)

28—CLASSIFIER offers operating efficiency

The Gravitational-Inertial Classifier, with no moving parts, is said to have low power requirements, and be so compact that a 30-ton-per-hour unit takes up no more space than an office desk. According to manufacturer, this classifier operates under all temperature conditions, is adaptable to most layout arrangements and requires no operator attention once set for operating conditions. It comes in sizes to handle from 100 lb to 100 tons of material per hour.

Air or gas entrained feed material enters through the top, cascades down past inclined vanes through which air and entrained fines are drawn off. By controlling



velocities of inlet air and vane exhaust air, gravitational, inertial, centrifugal and drag forces act on the particles so that smaller ones are drawn off through the vanes; the larger ones continue downward. A secondary air supply, introduced below the vanes, crosses the stream of coarse particles, scrubs away adhered fines, and circulates into the classifier chamber, exhausting through the vanes. It provides a means of controlling inlet air velocity and acts along with primary-air eddy currents as a moving wall which contains the curtain of feed material within the classification zone. The classifier is suggested for applications in 200-50 mesh (74 to 297 microns) range. Buell Engineering Co., Inc.

29—ZONE VALVE is small, motorized unit

Operating on low voltage upon a signal from its own thermostat, this small, compact valve is designed to provide for automatic multiple zone control on new or existing hot water heating systems. Its slow cycle of operation produces a desirable modulating effect, company says; it draws no current in either the open or closed position and its shut-off feature is such that no thermal leakage occurs. Features announced include overall height, position indicator, manual control, lifetime preset seal and auxiliary set of contacts in each valve for operating circulator or ignition without the use of further control apparatus. It is available in ¾-, 1- and 1¼-in. sizes. Regent Engineering Co.

30—PERCUSSIVE UNIT welds light gage metals

For end welding studs to light gage metals, the PS-1 Percussive Stud Welding Unit welds small studs and fasteners to various combinations of ferrous and non-ferrous metals and welds diameters to 3/16 in. According to manufacturer, fasteners can be welded to polished stainless steel, coated or enameled sheet and other metals without distortion, warping, burn through or discoloration to grain and

polish. A 2½-lb hand tool holds the stud and closes the circuit, allowing the welding current to be discharged when placed against the work surface. It operates from 115 or 230 v, single-phase, 60-cycle a-c. The power unit weighs only 144 lb and has wheels for portability. A vernier voltage control lets the operator select proper power setting and also serves as an adjustment where local conditions contribute low or excess power beyond that normally required. Average welding rate of studs or pins is given as six to eight per minute. The equipment is designed to handle thin metals down to 28 gage. K S M Products, Inc.

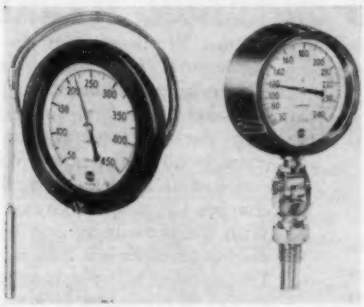
31—CONNECTORS have high burst strengths

Flex-Hose, a line of general purpose flexible metal connectors, is announced as featuring a braid design providing especially high burst strengths. These flexible metal hose sections are designed to attenuate transmission of vibration and pulsations into the rigid piping. They isolate pipe lines from pumps, compressors, air conditioners, air handling lines etc., which create vibration, and they serve to compensate for misalignment and reduce strain on piping. Flex-Hose is made of corrugated seamless tubing, protected and reinforced by outer braiding. Maximum steady working pressures at 70 F vary with size up to 1700 psi. Pressure ratings can be increased by multiple braiding. Operating temperatures can be as high as 750 F.

Series B Flex-Hose has bronze tubing, single bronze braiding and brazed fittings for 12 pipe sizes from ¼ to 4 in. ID, stock lengths 8 to 27 in. Series S has steel tubing, woven steel wire braid, and welded fittings, for seven pipe sizes from 5 to 16 in. ID, stock lengths 31 to 72 in. Hose is also available in stainless steel and Monel. Bulletin K11A gives complete data. The Korfund Co., Inc.

32—THERMOMETERS measure —350 to 1000 F

Supertherm, a redesigned line of indicating dial thermometers for measuring temperatures in the range of —350 to 1000 F, includes remote or direct reading types. It provides methods of ambient temperature compensation; four filling mediums, or actuations (vapor, gas, mercury, and organic liquid); a variety of case sizes, materials and styles, and thermometer bulbs to suit application needs.



Remote reading models use conventional armored capillary tubing to connect temperature sensing bulb to dial indicator which can be up to 125 ft from the bulb. Because such systems are subject to ambient temperature errors with certain filling mediums, suitable compensation methods are included for applications requiring them, manufacturer states. Direct reading styles, in which the bulb is closely coupled to the dial indicator, include a rigid stem, and multi-angle type, the latter having a swivel mounting head to permit adjustment of the dial face. United States Gauge Div., American Machine and Metals Inc.

(More New Products on the next page)

We're Still Looking for a **Pipe Fitter** Who Doesn't Prefer RIDGID®

"Of Course I said RIDGID ... It's the only pipe wrench for my money. I've got work to do!"

At your Supply House

The Ridge Tool Company Elyria, Ohio, U.S.A.

THREADED PIPE ... *It's Tight ... It's Best ... Costs Less!*

For more facts circle 597 on Reply Card

SEE . . . Megger® Insulation Testers • Megger Ground Testers • Megger Low Resistance Ohmmeters • Biddle Dielectric Test Sets • Biddle Motor Rotation Testers • Jagabi® Hand Tachometers and Tachoscopes • Frahm® Resonant Reed Tachometers . . . and other products for the practical maintenance man.

MAINTENANCE is KING in TODAY'S ECONOMY

Concern for old and obsolete equipment is very much on the minds of management everywhere. With the wave of new plant construction receding, emphasis, now, is swinging to existing facilities . . . modernization and maintenance improvements.

Patchwork Pattern of Maintenance Won't Do

Production equipment downtime or any form of emergency repair or replacement represents the most costly kind of loss—and emergency maintenance is costly too.

Minimize Downtime With Planned Outages

A good preventive maintenance program will reduce costly emergency maintenance due to breakdown. More important it will help to maintain production at the required levels.

A Booklet of Equipment for Preventive Electrical Maintenance

The complete line of Biddle Electrical Testing and Speed Measuring instruments is described in "Biddle Instruments for Every Industry". Get your copy at the Plant Maintenance Show or Write for Bulletin 19-58 PL.

IT PAYS TO VISIT TRADE SHOWS

Most men in management encourage trade show and conference attendance by their operating staffs and many attend themselves. It is perhaps the only way they can hear so much, and see so much that is new, in a short space of time. There is real economy in being able to examine hundreds of manufacturers' products and sit in on shirt-sleeve sessions on everyday problems with practical men—specialists in their fields.

Write for Complete Check list of Literature 19-58-PL.

B-901

JAMES G. BIDDLE CO.

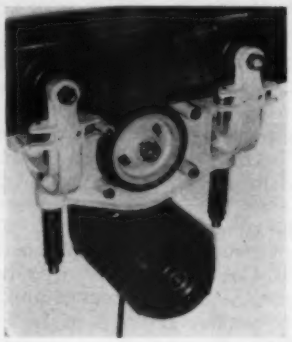
Electrical Testing Instruments • Speed Measuring Instruments
Laboratory & Scientific Equipment
1316 ARCH STREET, PHILADELPHIA 7, PA.

NEW PRODUCTS

(Begins on page 144)

33—MONORAIL TRACTOR propels cranes, hoists

This fluid-drive monorail tractor, features a trolley arrangement adaptable to all sizes and types of track; a one-piece, oil-tight, aluminum alloy housing; a wide range of speeds; and easy access to drive wheel tire. Maximum draw bar pull is 250 lb. Speeds range from 36 to 300 fpm; horsepowers from ½ to 1. In addition to fluid drive, the unit is also available with single-speed, two-speed, or variable-speed slip ring motors. Consolidated Crane & Engineering Corp.



34—SPRAY NOZZLES discharge at low pressures

For general service in discharging large quantities of liquids at low pressures, Fig. 627 Spray Nozzles produce medium to coarse, evenly distributed, solid-cone sprays with a normal spray angle of 70 deg. This pattern of distribution is reported particularly applicable to scrubbing of fumes, cooling of gases, gas washing operations and feeding liquids into packed towers. The nozzles come in 10 orifice sizes. With water supplied at 10 psig, the smallest discharges 1.2 gpm, the largest 120 gpm. With pressure increased to 100 psig discharge rates are 3.75 to 375 gpm. The nozzles will produce solid-cone sprays at pressures as low as 3 psig. Bulletin 6A-627 gives data. Schutte and Koerting Co.

35—STILL CAMERA with automatic focusing feature

Unlike still cameras which incorporate light meters but require manual exposure setting or focusing, the Infallible is announced as fully automatic. A photocell or electric eye computes the light reading and sets the lens opening, leaving you

Pittsburgh Superfine is quickly cut to correct size with a knife. Cut sections are then bonded to duct with adhesive. Extra adhesive is applied to edges of insulation to adhere them to edges of metal.

"We used one-inch, 1½-lb. density Pittsburgh Superfine Fiber Glass Insulation with a Neoprene coating to line all ducts," says Mr. George P. Fenton. "Superfine is flexible, adaptable and easy to handle."

At Greater Pittsburgh Airport's New Extension— Pittsburgh Superfine Insulates Air Conditioning Duct Work

"When our company installed the sheet metal ducts for the two air conditioning systems at Greater Pittsburgh Airport's new East Dock, we used over 7,000 sq. ft. of Pittsburgh Superfine Fiber Glass Insulation as the acoustical and thermal lining for the ducts," reports Mr. George P. Fenton, General Manager, McIlroy Sheet Metal Engineers and Fabricators, Pittsburgh, Pennsylvania.

Why Pittsburgh Superfine was specified

"This job called for an insulation that could withstand air velocities, would have proven erosion resistance, would provide good acoustical properties at minimum cost, and would insure resistance against temperature differential. Pittsburgh Superfine met all these requirements easily."

Easy to work with on the job

"We've used Pittsburgh Superfine often, and know from experience that it's flexible, adaptable, easy to handle and easy to cut. It's especially adaptable for use in irregularly curved ducts. There was not a single installation problem on the airport job that we could not handle with Superfine," concluded Mr. Fenton.

Pittsburgh Superfine Fiber Glass can help you, too!

It's rot proof, fire-resistant . . . and it's the finest insulation against heat, cold or noise you can get! Available in a variety of facings to meet your needs. For complete information, write to *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pa.*

PITTSBURGH SUPERFINE IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, Minneapolis, New York, Philadelphia, Pittsburgh and St. Louis

FIBER PG GLASS PITTSBURGH PLATE GLASS COMPANY

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4-pass design:

High fuel-to-steam efficiency for greater fuel economy

EVERY CLEAVER-BROOKS boiler has 4-pass fire tube construction — to scrub more heat from the flame. Maintains high flue-gas velocity . . . to provide right conditions for optimum heat transfer. This is just one of the Four Design Standards that make pre-engineered Cleaver-Brooks boilers your best packaged-boiler buy.

Other Design Standards

5 SQ. FT. OF HEATING SURFACE per boiler horsepower — prolongs boiler life, assures greater efficiency and lower maintenance.

FORCED DRAFT supplies air for efficient combustion, regardless of draft conditions. Easiest to maintain of all air-control methods.

UPDRAFT CONSTRUCTION — Low furnace keeps hottest combustion gases well below water level for safety's sake.

This exclusive combination of Design Standards is the key to the superiority of Cleaver-Brooks packaged boilers, 15 to 600 hp, 19 sizes, 130 models; steam or hot water; oil, gas or combination oil/gas fired.

For all the facts, call your boiler man from Cleaver-Brooks or write Cleaver-Brooks Company, Dept. A, 364 E. Keefe Ave., Milwaukee 12, Wisconsin.

Cleaver Brooks®

ORIGINATOR AND LARGEST PRODUCER OF PACKAGED BOILERS

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NEW PRODUCTS

(Begins on page 144)

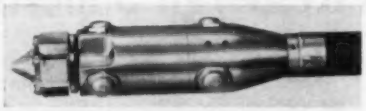
free to sight and shoot. When you press the button, light striking the photocell generates an electric current which sets the lens for correct exposure, it is explained. The lens adjusts to light changes faster than the human eye and continues to adjust whenever light reaches the photocell. A "stop and go" system in the viewfinder glows green when there is enough light for picture taking; a red warning flag goes up when light is inadequate. Once the picture is taken the shutter cannot be tripped until film is advanced.

Anticipated retail price of the Infallible, around $80.00, includes leather carrying case and flash gun for indoor photography. This camera uses 127-size film in black and white or color. Bell & Howell Co.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 177-178.

36—TUBE REAMER is air powered, fast working

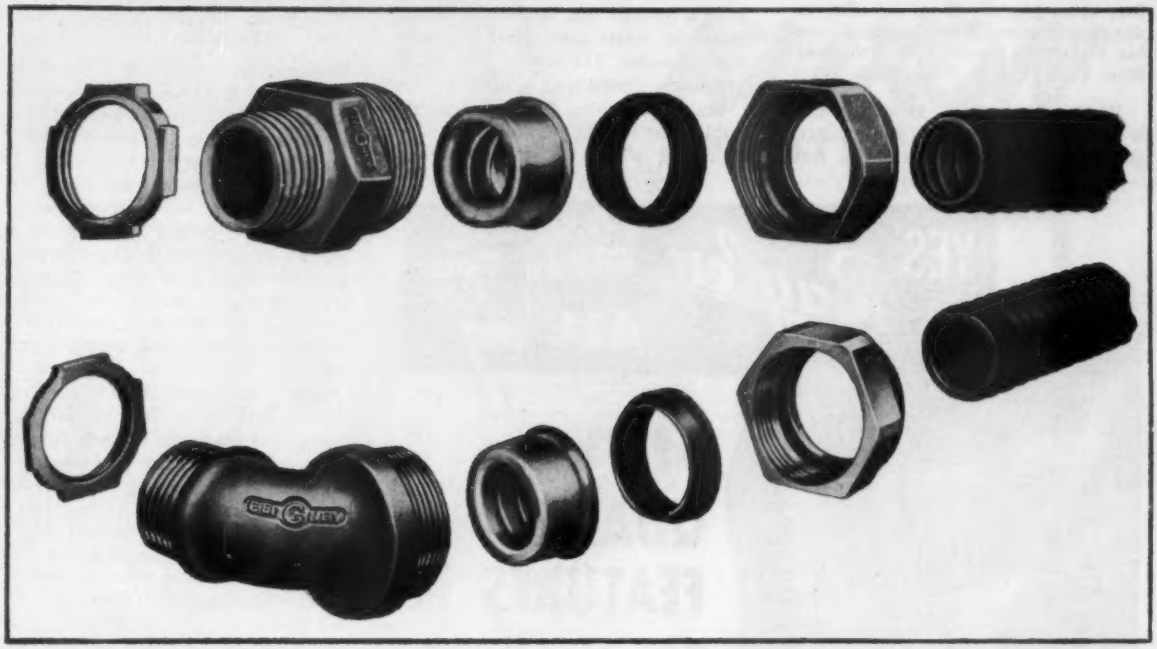
The Viking Jet-Air Tube Reamer cleans boilers up to twice as fast as many methods and requires only one man to operate, according to company. It operates on 60 to 90 psi of air pressure, and while designed for operation on a plant's



central compressed air supply, auxiliary compressors may be used when a central supply is not available. The reamer's air-driven motor rotates four steel scrapers at 4000 to 5000 rpm. Centrifugal force provides proper cutting pressure, it is noted, and spring tension and counterbalancing of cutter blades prevent slipping and wedging. Exhaust air from the motor is driven forward through jets in the nose of the tool. Fly ash, soot and scale are blown into the breeching and away from the operator, who controls the advancement of the reamer with the air hose. An on-off switch is provided to permit motor control by the operator. The reamer is available for standard, 3-in straight boiler tubes. Viking Research Corp.

For absolutely Liquid-Tite Connectors specify

GEDNEY— every time!



THESE ARE THE NEWEST, most efficient liquid-tite connectors available today for use with Sealtite* and equivalent liquid-tite conduits. Designed to give wiring installations absolutely dependable protection in these popular oil- and water-tight flexible raceways, Gedney Liquid-Tite Connectors are built for lifetime service.

As shown from left to right in the exploded views above, Gedney Liquid-Tite Connectors consist of:

1. **Locknut—nut stock steel—cadmium-plated**
2. **Main Fitting—straight, 90° angle, or 45° angle—malleable iron—cadmium-plated**
3. **Grounding Bushing—one piece—threaded to engage conduit spiral**
4. **Molded Vinylite sealing ring—pliable—ever-lasting**
5. **Gland Nut—malleable iron—cadmium-plated**

Standard sizes range from ⅜" to 2" straight, 45° and 90° . . . order Gedney Liquid-Tite Connectors for top safety and longest life.

* *Sealtite is the trade name of American Metal Hose Branch of the American Brass Company*

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GEDNEY

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NEW BOOKS

for the plant engineer

Facts About Industrial Water

WATER FOR INDUSTRIAL USE. Size 11 by 8½ in.; 52 pp including index; paper bound. Published by Columbia University Press, 2960 Broadway, New York 27, N.Y. Price $0.50.

WATER, A NATURAL RESOURCE that is probably often taken for granted, gets the spotlight in this report. And rightly so, with the increased demand for use not only in everyday domestic life but also in industrial activities.

Chapter one of this publication in its discussion includes comments on supplies. In the second section the report deals with the quantity requirements for cooling, steam generation, processing, and miscellaneous uses.

Other subjects taken into account in this booklet are: quality of water, industrial water costs, and conservation of water. The text of the report is fittingly closed with a summary.

Statistical tables at the end of the publication include the following data: estimated water use in the United States from 1900-1975; water requirements per unit of product in selected industries; water use and water treating processes in industrial plants.

Maintenance Painting

INDUSTRIAL MAINTENANCE PAINTING. Size 8½ by 5⅜ in.; 199 pp including index; illustrated; cloth bound. Published by Paul E. Weaver, 4025 Brady St., Baton Rouge, Louisiana. Price $5.50.

CONSIDERABLE amount of painting knowledge has been compressed into this relatively small package. This book cannot only be used as a reference but also as training guide for painters and supervisors.

In this second edition new chapters have been added dealing with: specification writing; paint testing; painting cost estimating; tank car and vessel painting and lining; proper use, care and selection of solvents; colors; and painting economics.

Other topics discussed in the book are as follows: surface preparation; protective coatings; coating application; steel design for corrosion prevention; shop painting of steel; and inspection.

Appendix includes numerous tables pertaining to such subjects as air and horsepower requirements for different size nozzles; film thickness per gallon per 100 sq ft for different solids contents; and air pressure loss for spray gun air hose.

Getting Along With Workers

HOW TO SUPERVISE PEOPLE by Alfred M. Cooper. Size 5½ by 8 in.; illustrated; cloth bound. Published by Mc-Graw Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. Price $4.

IN THIS FOURTH edition the book has been brought in line with today's conditions while it retains the practical viewpoint and direct treatment that set the pattern of earlier editions.

It covers all the typical jobs and plant problems of hiring, preventing accidents, promoting, teamwork, training workers, delegating authority, labor relations, etc. Techniques for handling them are discussed, with examples of typical problems and specific solutions now being used in general practice. Question material that suits the book for conference training is included.

Some of the new material incorporated in this edition is intended to help supervisors handle some of the problems they may encounter in the situations created by automation, communication needs, and present-day stresses in human relations.

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KLIXON-Protected Motors are a sure way to keep today's rising operating and replacement costs down.

Built-in by motor manufacturers as an integral part of the motor, the KLIXON Protector saves money and reduces equipment down time by keeping motors operating at their maximum safe capacity under abnormal conditions. They enable you to get total output from your motors.

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Rooftop Use—Over and Under

(Continued from page 125)

in an extension of the tower sump and used with pressure control to pump cool water in a closed system to the various pieces of equipment requiring it and then back to the water distributing troughs at the top of the tower.

Water losses are made up with city water using probe-type level controls.

Among other features of this unusual setup are specially-designed wax melting and mixing tanks located on the mezzanine floor to melt bulk wax of various types and mix plastics and other additives with the wax blends (for pattern waxes).

Holding tanks of similar design are located on the floor under the mezzanine. Waxes, after melting and blending, are dropped from the upper tanks (in hot water-traced piping) to the holding tanks. There they are kept at proper liquid temperatures for dispensing to molding machines.

These tanks are water-jacketed with closed circuit hot water heating using electric heaters, circulating pumps, automatic temperature control, motor-operated mixers, etc.

Different designs were required for the melt-and-mixing and for the holding tanks.

Another outstanding feature is the use, in production areas, of recently developed color-corrected mercury lamps shielded with prismatic glass and powered by constant wattage ballast. This reduces to a great extent the number and size of reflected light images and promotes greater efficiency in grinding the small, intricate shapes produced in the plant. **End**

Screen Blocks

(Continued from page 123)

Typically, standard two- and three-celled blocks, their cells holed vertically, can be, and usually are, heavily reinforced. Much of their strength is in their cells (for, inserted with reinforcement bar and grouted, cells combine to form a solid concrete block). Reinforced, concrete block can be tiered to considerable heights without columns or steel-framed supports. Not so, however, the screen block . . .which, in most cases, is devoid of cells.

Because they have no cells (one type of screen block does have cells, but it's a maverick) design blocks can be only lightly reinforced within the wall structure itself, and this usually only between the wall's narrow, ⅜ in. joints. Almost always required are columns of I-beams (in some design curtains, 4-in. I-beams frame the blocks).

For example, an 8-ft high by 12-ft screen-block curtain might be supported at its vertical extremities by 4 in. I-beams tied to a weight-bearing header, the entire structure set on an engineered footing. Quarter-inch reinforcing rods might reinforce each horizontal joint, while ⅜-in. rod might be run vertically, either in every vertical joint or on 2-ft vertical centers.

(Continued on page 174)

SPECIFIED
FOR RUGGED DUTY

OVER AND OVER AND OVER AGAIN

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SUPER
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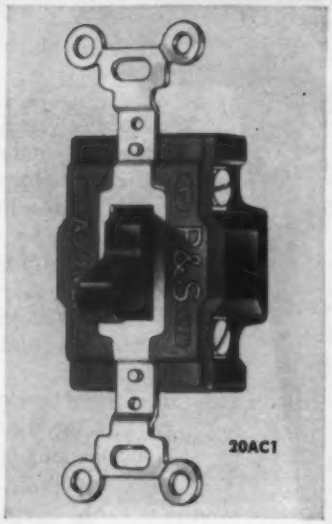

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- Can be used to *full rated capacity* on inductive loads.
- Heavy plastic body.
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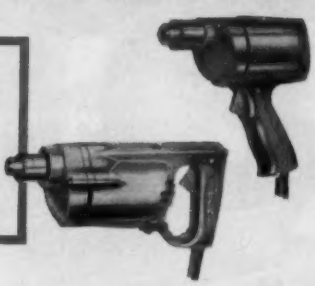
For production and maintenance

Milwaukee **HEAVY-DUTY DRILLS**



A Type and Size for Every Kind of Job

Capacities . . . 1/4" to 1"
1/4 to 1-1/2 Horse Power

Powered by MILWAUKEE-built efficiency air cooled motors . . . fully protected against overloads. Grease sealed Ball and Roller bearings.

- Hardened helical steel gears. More teeth in mesh for smoother, quieter running . . . greater working power.
- Functional "In-Line" design assures greater drilling accuracy.
- Double and triple reduction gearing for specific high torque requirements.
- Perfect balance . . . easy handling . . . less operator fatigue. Easy grip, no-slip, glare-proof satin-like finish.
- Split-body and handle designs . . . provide easy access to commutator, electrical connections, switch, etc., for inspection, cleaning or maintenance.
- Heavy duty "Jacobs" industrial chucks.
- 115 Volt Standard . . . 230 Volt available.

There is a MILWAUKEE drill for *every* drilling job. Each is engineered and built for but one purpose . . . heavy duty production use. The powerful motors in these drills are completely manufactured in MILWAUKEE'S own plant . . . designed and built specifically for the tool they power and the job they're to do.

MILWAUKEE has built motors for heavy duty electric tool service for more than 30 years. This long experience and motor building "know-how" is reflected in dependable stall-proof power, best performance and longer life, so characteristic of *all* MILWAUKEE tools.

Stop in at, or call your nearest MILWAUKEE tool distributor for a convincing demonstration. Let him prove to you why MILWAUKEE has become the *preferred* drill in industry.

Write for Bulletin D-16.

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MORE POWER PER DOLLAR

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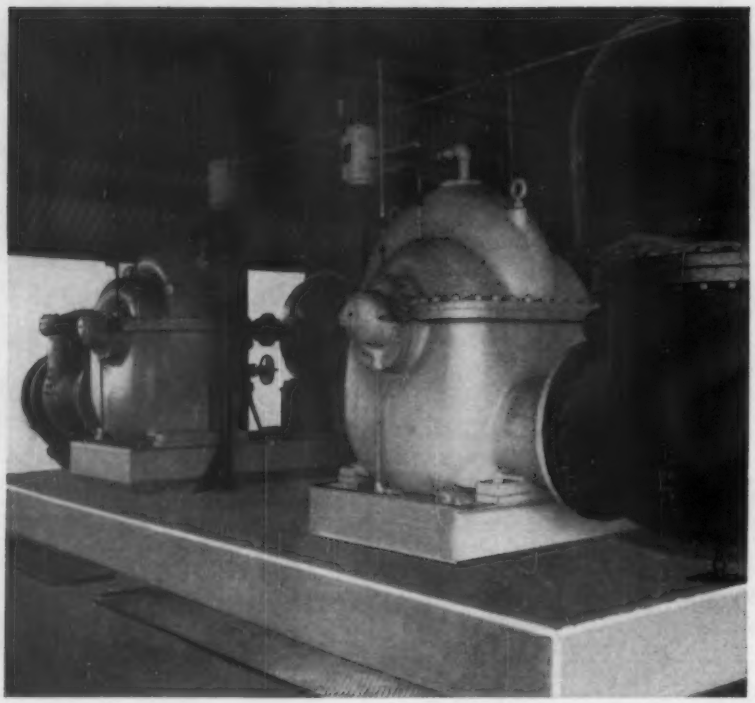

the bigger your pumping problems... the better your reasons for giving them to **WHEELER-ECONOMY**

St. Regis Paper Company did, at its Jacksonville, Fla., plant. The Units you see here are two Wheeler-Economy 30" x 24" Horizontally Split, Double Suction Pumps. They deliver 20,000 gpm each against a 60' head, to a surface condenser and several barometric condensers.

At C.H. Wheeler you can get help on large pumping problems that cannot be exceeded anywhere in scope and thoroughness. For example, Wheeler has one of the world's largest and best-equipped Pump Test Laboratories. Accurate scale models of complete circulating water intake tunnel structures for industrial power plant installations are built and tested in this Laboratory.

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Centrifugal, Axial and Mixed Flow Pumps • Steam Condensers • Steam Jet Vacuum Equipment • Marine Auxiliary Machinery • Nuclear Products

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You'll find two postage-free Reader Service Cards on pages 177-178. Use them for ordering product information — just circle item numbers of the products you would like to know more about. You may also use the cards for requesting advertising catalogs.

Screen Blocks

(Continued from page 172)

Just as often, screen walls are reinforced with No. 2¼ wall mesh wire. Mortar mix is identical to that used for common block construction: a 1:3½ or 1:4 cement-to-sand ratio.

Where only one side of the screen is visible, some engineers specify I-beam reinforcement behind the design-wall, a 4-in. I-beam (vertical) run every 4 ft and capped with an I-beam run horizontally. Wall ties — spaced every 12 in.—bond blocks to their reinforcing beams.

One block designer recommends a 6- by 6-in. footing under screens 3 ft high; and a 10-in. deep, 12-in. wide footing for walls 6 ft high.

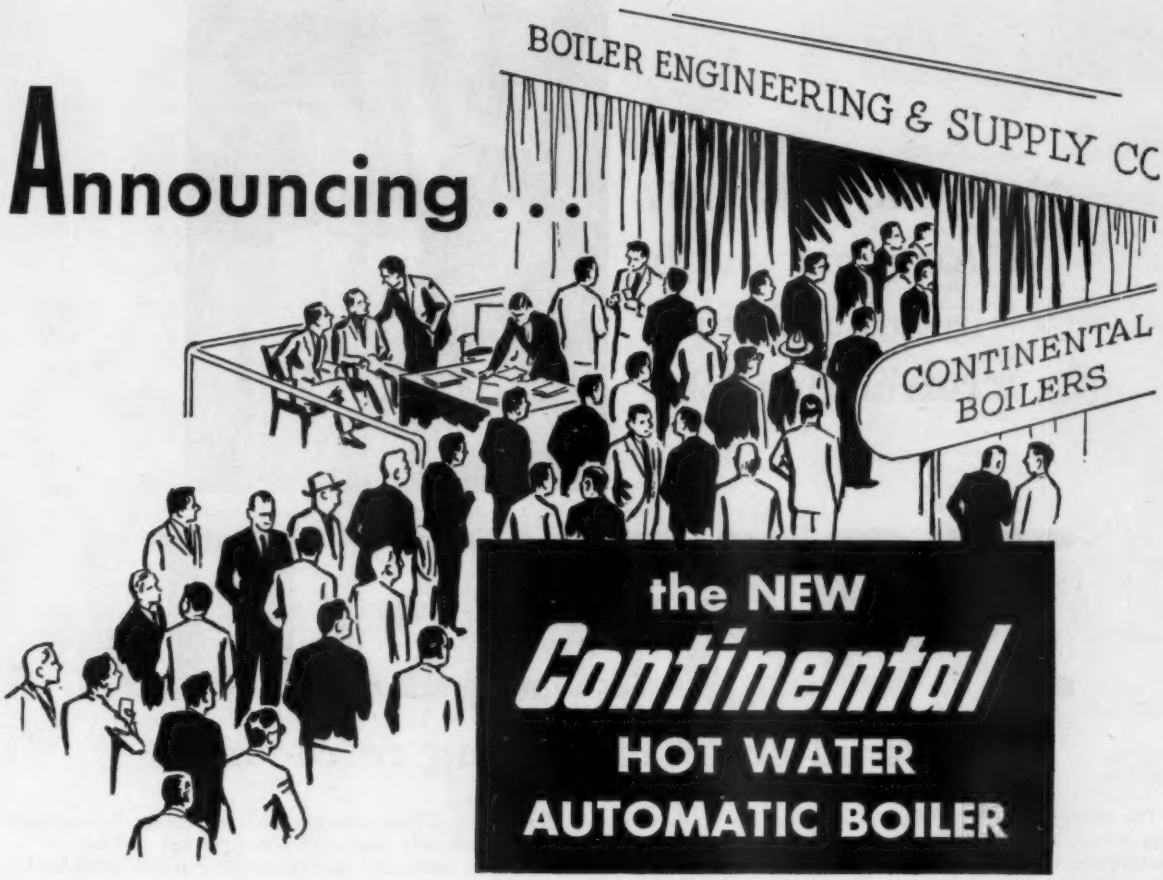
Recommends Van Nuys, Calif.'s General Concrete Products, Inc., among California's largest screen block makers: "Screen walls with no support at top or ends should be built with a return for lateral support. If the return is built of the same block, the return should be about 0.6 of the wall's height. If return is wider, it need not be so long but a larger footing is necessary. A small foundation is also necessary under the vented screen block.

"Free-standing walls require either steel supports or block columns. Columns for excessively high walls (over 12 ft) may require caissons. A high free-standing screen wall requires a beam at the top and either concrete block or steel columns supporting the beam. A simple method might see the beam supported by external I-beams tied to the vented block at regular intervals. Or T-angle steel columns may be embedded in the vertical joints. Such supports should be at 4 ft centers in at least one direction."

Used as veneer—and backed by the wall it screens — a design-block screen can go as high as 12 ft with relatively simple structural support. Free-standing, the same wall can only be built to a height of 6 ft without engineering.

As veneer, screen blocks are treated as any veneer—tied to the back-up wall with appropriately spaced wall ties. **End**

Announcing . . .



the NEW *Continental* HOT WATER AUTOMATIC BOILER

Shown for the first time at the ASHAE Show in Philadelphia January 26-29

Here is a completely new approach to Hot Water Boiler design. Continental gives you all the features you want for efficiency . . . for economy . . . for low maintenance costs. Check these performance advantages:

- In the history of package boilers, there has never been a single case of damage due to "thermal shock" with the Continental Boiler.
- Operates at high or low water differential temperatures . . . at high or low rates of water circulation . . . responds rapidly to temperature controls.
- May be used for either direct or reverse flow.
- Has internal expansion space to cushion the dynamic surge of circulators and eliminate entrapped air from system water.

For complete engineering data on the new Continental Hot Water Automatic Boiler, see the Continental representative or write for Bulletin BE-200.

BOILER ENGINEERING & SUPPLY CO., INC.
Phoenixville, Pa.

For more facts circle 607 on Reply Card

FIRST CLASS

NEW MATERIAL
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insulating and
refractory jobs

FOAMSIL®

the acid-proof insulating refractory

The photograph above illustrates one critical application in which material failure would be, to say the least, unfortunate. Undoubtedly *you* have many severe plant or process operations where insulation or refractory failure would be equally unfortunate. It is for just such applications that Pittsburgh Corning has developed its new acid-proof insulating refractory—called FOAMSIL.

FOAMSIL is 99% pure silica expanded to form millions of airtight cells. These cells create excellent insulating value, and since the cells are sealed against moisture, that insulating value remains constant.

Because FOAMSIL is composed of silicon dioxide, it cannot oxidize further—thus withstands high temperatures. It won't react with common acids and has a high melting point. It is incombustible, will not lower the flash point of hydrocarbons, will not thermal shock and is dimensionally stable. It is easy to cut and fit.

Among potential applications for which FOAMSIL should prove ideal are these: acid-proof tank linings . . . precipitators . . . furnace linings . . . lead acid chambers . . . concentrator towers . . . stack and flue linings . . . reradiating shields . . . environmental test chambers . . . insulation for underground piping. Your own insulating and refractory requirements will undoubtedly suggest a host of other uses for FOAMSIL.

Write today for a free sample of FOAMSIL and complete descriptive literature. Find out how to put this unique new insulating refractory to work to improve *your* operations. Write Pittsburgh Corning Corp., Dept. PES-19, One Gateway Center, Pittsburgh 22, Pa.

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MOISTURE-PROOF

EASY TO WORK

SIZES AND SHAPES

FOAMSIL is ideal for temperature ranges from −450°F to +2200°F continuous. It is available in flat blocks up to 3 inches thick measuring 11″ x 17″ or 17″ x 22″ . . . and in various standard or special shapes including internal or external pipe insulation, curved sidewall segments, and fitting covers.

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BULLETINS

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PLANT ENGINEERING

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BULLETINS

(Begins on page 21)

144 Bearings, Bushings, Parts—This 72-pp catalog presents company's Graphex, Coprex and Woodex oilless and self-lubricating bearings, bushings and machine parts, and is a reference guide for sintered metal parts. Includes details on several alloys and their recommended usage; properties of powdered metal compositions; standard sizes of bearings available; details on manufacturer's facilities and equipment available. Includes microphotographs of metal structures in various stages of development. Wakefield Bearing Corp.

INSTRUMENTS, CONTROLS

145 Control System Guide—To aid in designing and planning an automatic control system for most types of heating, ventilating and air conditioning installations, 8-pp Form F-8944 analyzes three important phases of planning. Part 1 discusses application, advantages and features of company's Electrionic control centers. Part 2 presents electric, electronic and Electrionic types of control. Part 3 deals with selecting power control system and covers factors to be considered. Barber-Colman Co.

146 Industrial Control — Eight-pp Bulletin 958 illustrates and describes a line of industrial control equipment, including push-button stations, speed-responsive switches, resistors, assembled controllers, contactors and relays, drum controllers, others. The Euclid Electric & Mfg. Co.

147 For Centralized Control—Bulletin 106, 16 pp, illustrates and describes the design approach, materials, construction and modern facilities used in manufacturing a variety of centralized control and data presentation systems. Panellit, Inc.

148 Liquid Level Gages—Eight-pp Catalog 338 covers Truscale gages including standard, Red Flasher and inclined styles. Information on various styles, models and datum columns simplifies selectioin of gage for a specific requirement. Gives operation and application data, shows accessories. Jerguson Gage & Valve Co.

149 Draft and Draft Gages—The What, Where, How and Why of draft as it affects efficiency of combustion process, together with full details on types of draft gages, forms the subject matter of 20-pp Bulletin 58-S201. Tells what draft is, how it is measured, what the draft gage tells, and how to select draft gage to suit requirements, as well as where to measure draft and pressure in a steam plant, where to connect and how to install draft gages. The Hays Corp.

150 Well-Type Manometers—A redesigned and expanded line of well-type manometers for measuring pressure, vacuum, and differential pressure in plants and laboratories is described in 24-pp Catalog 2008. Features of design and construction are illustrated and detailed specifications are included. King Engineering Corp.

151 Plating Room Instrumentation—This folder describes temperature controls for plating and metal finishing applications. Features pneumatic controls designed to stand corrosive atmospheres of plating rooms and to provide close tolerances and constant control required. Also presents electrical controls—non-indicating, indicating and recording—and thermally operated gas controls and thermometers. The Partlow Corp.

152 Electronic Counters—A line of totalizing and predetermined electronic counters for laboratory or production control service is described in this illustrated bulletin. Detailed specifications. The Redford Corp.

METALS

153 Steel and Aluminum Data—This new 156-pp edition of company's Data Book includes aluminum analyses, characteristics, mechanical properties and tolerances, in addition to information on steel such as machining and fabricating data, manufacturing practices and tolerances, weights, safe loads, ASTM standards, compositions and properties, and miscellaneous facts of practical value. Book is available to qualified plant engineers. Please state your job title. Joseph T. Ryerson & Son, Inc.

154 Aluminum in Electrical Systems—Electrical applications of aluminum are described in this 32-pp bulletin. The report discusses current economics of choosing aluminum for a broad spectrum of electrical applications. Topics include conduit, wire and cable, bus conductor, busway, armored cables, enclosures and switchgear, lighting fixtures and accessories, and such other components as reactors. Aluminum Co. of America.

VALVES, PIPING, HOSE AND FITTINGS

155 Temperature Control Valve—Bulletin J-180 describes a sliding gate, self-operating temperature control valve for ventilating and process systems, heating and cooling. A cutaway showing components is included, as well as drawings of typical installations. Tables giving dimensions, weights, valve sizing charts are also provided. Jordan Industrial Sales Div., OPW Corp.

156 Solenoid Valves—Featured in this 8-pp bulletin are packless solenoid valves designed to permit more flow at any pressure up to maximum rated capacity. Specifications and performance charts are included, as well as flow patterns, dimensions and a selection chart. C. A. Norgren Co.

157 On Lightweight Pipe—Eight-pp Bulletin 59 is a condensed catalog on steel pipe, fittings, flanges and connections featuring strength and light weight. Data include standard specifications for Lockseam Spiralweld pipe in 4- to 30-in. diam, information on one-piece Wedgelock couplings and other connections, and standard fittings and welding flanges. Ordering information and application suggestions in many industries are also provided. Naylor Pipe Co.

158 PVC Pipe, Fittings—This 12-pp bulletin contains latest technical information on polyvinyl chloride pipe and fittings, including advantages and properties, general characteristics and applications, physical properties, installation instructions, flow rate charts and specifications. Also included is a chemical resistance chart of various reagents and their effect upon PVC pipe and fittings. Mueller Brass Co.

159 Stainless Steel Fittings—Dimensional data on stainless steel welding fittings and flanges manufactured by this company is contained in 54-pp Catalog TT 600. Updated technical data for allowable S-values, allowable working pressures of fittings, pressure-temperature rating of flanges and corrosion resistance are furnished. Applications for stainless steel piping, welding procedures given. Tube Turns, Div. Chemetron Corp.

160 18-8 Tubular Products—Eight-pp Technical Data Folder TDC-190 covers 8-18 stainless steel tubing and pipe, fittings and flanges. Contains data on analyses, corrosion and oxidation resistance, high and low temperature characteristics, physical and mechanical properties of this family of stainless steel. Tubular Products Div., The Babcock & Wilcox Co.

Postage-free Reader Service Cards make it easy to order bulletins. Cards are provided on the facing page.

161 Hydraulic Fittings—Divided into three sections covering self-flaring fittings, no-flare fittings and flare-type fittings, 28-pp Catalog 556 features a line of hydraulic tube and pipe fittings. Each section contains information on design and installation of particular type covered plus detailed dimensional and engineering specifications. Flodar Corp.

162 Special Fixtures—Special purpose water faucets are illustrated and described in 64-pp Catalog 58SF. Designed to supplement company's general catalog, this booklet covers faucets for a wide range of applications, as well as interchangeable spouts, supply connections and related fittings. Special attention is given to faucets with integral vacuum breakers. Detailed dimensions and roughing-in data. The Chicago Faucet Co.

163 Teflon Hose—Finger-Flexible Teflon hose for industrial and other applications is described in 6-pp Bulletin 4001-A. Construction features detailed and specifications and ordering data given in illustrated form, along with a performance chart for convoluted hose, lists of hydraulic and other applications. Titeflex, Inc.

BULLETINS

(Begins on page 21)

164 Flexible Metal Hose—Detailed instructions on how to install all types of flexible metal hose properly, in order to secure the longest service are given in Bulletin N14A. Eight diagrams explain correct use of flexible connections to compensate for misalignment, and to eliminate vibration transmisison. The Korfund Co., Inc.

MAINTENANCE

166 Tips on Painting—"Your Next Paint Job," 16 pp, tells how to obtain low cost painting suited for lasting results for both exterior and interior applications. Discusses painting from aspects of type of surface to be painted, operating conditions encountered, labor needed. The Tremco Mfg. Co.

167 Red Lead Primer—Paint with a red lead-iron oxide-zinc dust pigmentation in an alkyd resin vehicle for protecting galvanized steel surfaces is described in Technical Letter 13. Composition of formula is broken down, and details on surface preparation given. Lead Industries Ass'n.

168 Wooden, Aluminum Ladders—Bulletin L-94 describes company's Gold Medal and safety aluminum ladders. Contains illustrations, construction details and specifications of over 20 types of ladders including those for electricians, mechanics. The Patent Scaffolding Co., Inc.

CONSTRUCTION

169 Steel Building Products—New load bearing punched channel studs, rigid frames, acoustical ceiling deck and wide rib deck are among products presented in this 24-pp booklet. Technical information is given for the new items as well as company's line of joists, studs, channels, beams, C-sections, roof deck and curtain wall. Illustrations and text show how each product is best used in a variety of applications. Stran-Steel Corp.

170 Panels for Re-Usable Forms—This 8-pp bulletin covers Weldwood panels for re-usable concrete forms, providing information on how to select and specify panels and how to assure maximum re-use. Both textured and smooth-faced panels are presented. An index-chart outlines individual characteristics of the various Weldwood form materials available. United States Plywood Corp.

171 Ceiling Systems—Three new ceiling systems are described in 6-pp folders giving information on design and construction features, mounting details, lighting characteristics, the shielding media available, dimensions. The systems include one for creation of custom appearance with standard components; one utilizing a new technique in high illumination levels; and one for overall illumination available with translucent acoustical element. Smithcraft Lighting.

172 Foam Insulation — Expanded polystyrene insulation for cold storage applications is featured in this illustrated bulletin. Method of application is shown and physical and thermal properties listed. Johns-Manville.

173 Insulating Material—This folder contains information on Foamisil, a foamed silica material for insulation and refractory applications. A list outlining physical characteristics of the material, along with recommendations for its possible uses, is provided. Pittsburgh Corning Corp.

174 Hot Applied Mastics—Eight-pp Bulletin 2 describes an acid- and chemical-resistant and waterproof mastics for floors, and other surfaces, and linings for tanks, gutters, sumps. Featured are special mastics and electrically conductive types for use where inflammable gases, chemicals and explosives are handled. Typical specifications and cross sections shown. Ralph V. Rulon, Inc.

175 Grout Cement—Bulletin 108A describes a colored acid-proof grout cement for brick, tile and glass block. Advantages and applications are described, method of grouting new and existing floors detailed, and physical properties of the cement listed. Nukem Products Corp.

176 For Drainage, Construction—Twelve-pp Catalog GEN-10658 features drainage and construction products for industrial uses. Included are data on corrugated metal pipe and pipe arch; paved-inert pipe and pipe-arch; Asbestos-bonded pipe and pipe-arch; multi-plate pipe, pipe-arch and arch; perforated pipe; water control gates; guardrail; liner plates; bin-type retaining walls; sheeting. Armco Drainage & Metal Products, Inc.

177 Pipe Suspension, Support—Advantages of pipe hangers and suspension equipment in the field of industrial construction are discussed in this 22-pp bulletin. Generously illustrated, it covers a variety of suspension products and includes specifications. Fee & Mason Mfg. Co., Inc.

178 Metal Framing System — An all-purpose bolted metal framing system is featured in this comprehensive, 180-pp pocket-size booklet. Utilizing a simplified indexing system, it presents fundamental features and includes illustrations of over 1,400 fittings. Abundant illustrations and explanatory notes aid in identification of parts. Along with a listing of channel members, fittings and other parts, bulletin shows typical applications, and includes channel with specifications. Unistrut Products Co.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

179 Hydraulic Power Tools—Bulletin A-5-58 covers independent pump hydraulic jacks, single and double plunger hand pumps and double acting air engine pumps. Advantages are detailed, typical applications discussed, and specifications included. H. K. Porter Co., Inc.

180 Electric Tools — Heavy-duty electric tools for construction and industry, including drills, saws, grinders, hammers, screw drivers, nut runners, sanders, and polishers, are featured in illustrated Condensed Catalog G8. Complete descriptive data and specifications are included. Milwaukee Electric Tool Corp.

181 Grinding Wheel Rules—Safety recommendations for grinding wheel operation are detailed in this 24-pp booklet. Discusses maximum peripheral speeds, strength classification of grinding wheels, definitions of maximum speeds, effect of wheel speed on grinding action, safety guards, mounted wheels, proper mounting procedures, truing and dressing, and do's and don'ts for safe grinding. Grinding Wheel Institute.

182 Automatic Turret Lathe—A faster automatic chucking turret lathe is described in 22-pp Catalog 1179A. Explains basic principles whereby speeds, feeds and machine functions can be preselected electrically, cutting previous setup time. Along with information on machine and accessories, job applications are illustrated and explained. Also included is specification chart. Gisholt Machine Co.

183 Precision Lathes—Featured in this 42-pp bulletin are precision instrument lathes with enclosed head stocks, V-belt drives and tubeless variable speed control. Complete information on lathes and accessories is presented, and photos, dimensional data and specifications included. Louis Levin & Son, Inc.

184 Flexible Shaft Machines—Grinding, sanding, polishing, buffing, wire brushing, sanding wood, and drilling in steel or wood can be done with attachments by the multi-speed or single-speed flexible shaft machines described in 8-pp Catalog 59. Information is given on standard flexible tool shafts, power drive flexible shafts, others. Stow Mfg. Co.

185 Special Purpose Electrodes—Bulletin 7000.2 is a 20-pp catalog and procedure guide for manual arc welding electrodes for hardsurfacing and for welding stainless steels, non-ferrous metals and cast iron. Describes each electrode, its properties and applications, and how to use it. Charts aid electrode selection and identification and give welding machine settings. The Lincoln Electric Co.

186 Tube Expander Drives—Data on Torq-Air-Matic automatic tube expander drives, including heavy-duty models, is provided in illustrated 6-pp Bulletin 581. A selection chart lists three basic models, for condensers and evaporators, for heat exchangers and for boiler tubes, with information on different versions of each model, including torque, rpm, and tube size. Thomas C. Wilson, Inc.

OTHER EQUIPMENT

187 Pipeline Aftercoolers—Eight-pp Bulletin 302.6K1, on pipeline aftercoolers, describes and illustrates their steel shell construction, removable

Tuffy Tips On **SAFE USE OF SLINGS AND HOIST LINES**

Lifting Strains Take High Toll of Injuries

Did you know that in some states one in every six compensation claims involves back injuries? And that one insurance company says back injuries constitute 60% of their claim expense?

Hernia is another hazard of materials handling. One manufacturer reported 75% of his compensation claims involved hernias. This high incidence of hernias and back injuries can be greatly reduced by proper lifting equipment and methods.

What can you do to reduce materials handling accidents? Here are some of the answers:

1. Teach your workers rated load factors. Warn them not to overload slings.

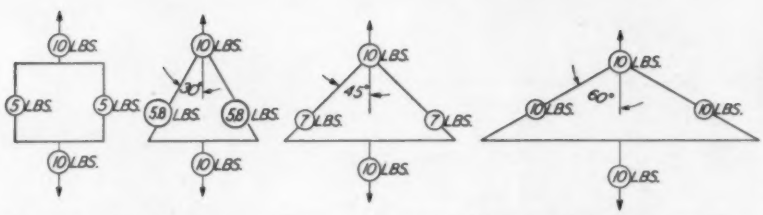
2. Use the right size hoist for every heavy lifting job. Don't put the load on human muscle.

3. Show workers how to rig hoists properly and safely. Load chains shouldn't be used as slings. Previous distortion and weakening of links may cause them to break even with a light load.

4. Inspect hoist load brakes often. Slipping or dragging brakes should never be used.

5. Be sure to use the proper sling for the job. Don't assume that all slings made of wire rope are right for all lifting operations.

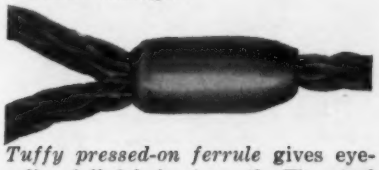
How Sling-Leg Load Increases with Increased Fleet Angle



These four drawings show approximate load increases on each leg of a bridle sling as the vertical angle of spread between legs increases. For accurate factors for the various angles, refer to your Tuffy Sling Handbook. (Don't have one? Write Union Wire Rope Corporation. Specialists in high carbon wire, wire rope, braided wire fabric and stress relieved wire and strand. 2272 Manchester Avenue, Kansas City 26, Missouri.)

Why Tuffy Slings Do A Better Job More Safely

Tuffy Slings have a combination of extra strength and super flexibility. The patented machine-braided fabric is the secret. It gives Tuffy greater strength, faster handling, longer life, greater safety than ordinary slings—at a cost to service life ratio that figures low. And it's so flexible that kinks can be pounded out without material damage.



Tuffy pressed-on ferrule gives eye-splice full fabric strength. The steel ferrule is applied under tremendous pressure. It literally flows into spaces between wires and strands. The friction force thus created gives the eye-splice 100% of the fabric strength. And the streamlined Tuffy ferrule leaves no openings or rough projections to snag or injure hands.

Tie a knot in a Tuffy Sling? Pull it as tight as you can. Even if you kink it, it's still easy to straighten out with no material damage to the sling.

See Your Tuffy Distributor

He's stocked for fast delivery of all your Tuffy Slings and Union Wire Rope needs.

Get Your FREE Tuffy Sling Handbook

Gives full data on Tuffy Slings. Types, dimensions, weights and rated loads. Also contains an expanded section on fittings — many not previously shown. Write for your copy now.

UNION Wire Rope

ARMCO

Subsidiary of ARMCO STEEL CORPORATION

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For more facts circle 609 on Reply Card

BULLETINS

(Begins on page 21)

corrosion-resistant tube bundle, counter current flow design, and centrifugal moisture separator. Specifications give details on 54 models with capacities for operating pressures to 125 psig for single- and two-stage comprecision. Ross Heat Exchanger Div., American-Standard.

188 On Air Motors—Sixteen-pp Form 5072A features over 100 air motors covering a power range from 0.3 to 24 hp, with speeds from 50 to 2580 rpm. Both multi-vane and piston motors are listed with specifications and dimensions. Eight illustrated case histories show how these motors save time, money and manpower. Cutaway photos show design and construction details. Ingersoll-Rand Co.

189 Industrial Equipment—Featured in 12-pp Catalog A-659 are finishing systems, metal cleaning and pickling equipment, metal cleaning and rust proofing equipment, dry-off ovens and cooling tunnels, spray booths, coaters, filtered air supply systems, drying ovens, finish baking ovens, core and mold baking ovens, hydrofoam dust collectors and fog filters, steel conveyor racks and adapters, others. Typical installations are shown. The R. C. Mahon Co.

190 Feedwater Treatment—Technical Bulletin 589 contains complete details on a hydrazine product for boiler feedwater treatment. Data is presented to show that the product reacts with oxygen without adding any dissolved solids to the boiler water. Betz Laboratories, Inc.

191 Gas Turbines—Salient design features of company's gas turbines, types of fuels (natural gas, distillate, crude oil) plus applications in old fields and process industries are discussed in 14-pp Bulletin 167. Also included is an assessment of the integrated turbine—boiler package and likely future trends in turbine application. Clark Bros. Co.

192 Square Foot Converter—This 12-pp pocket-size booklet should prove a boon to plant engineers who want to know, quickly, square foot conversions for plastic sheets up to 67-in. by 102 in., the decimal equivalents involved, and sheet, rod and tube diameters and thicknesses. Two-way tables are sectionalized, and decimal equivalents chart and handy ruler for sheet, rod and tube diameters and thicknesses are provided. Commercial Plastics & Supply Corp.

193 Thread Comparator—Advantages of company's thread comparator for analyzing and inspecting threads in manufacture of screws and fasteners are detailed in 20-pp Circular 606. Includes information on selecting and mounting gage rolls, analyzing readings, components and accessories, and setting up for operation. Pratt & Whitney Co., Inc.

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided on pages 177 and 178.

INSTRUMENTS, CONTROLS

301 Temperature Controls—Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating non-indicating controls; thermometers; bulb accessories. The Partlow Corp.

302 Pressure Gages—In 16-pp Catalog 305 are described gages, with and without integrated switches, used most widely in operation of power and steam plants, refrigeration systems, metal working industries, hydraulic presses, and others where steam, water and non-corrosive oils and gases are principal measured media. Specifications included. United States Gauge, Div., American Machine and Metals, Inc.

303 Automatic controls—Catalog 26 comprises 52 pages which describe and illustrate electric thermostats, pressure controls, humidistats, motor-operated valves, temperature regulators, motor operators, unit ventilator controls, hot water controls, electronic controls, control centers and accessories. Operational and application data is incorporated with the description of each control component. Barber-Colman Co.

304 Electronic Process Control—Series A-801 including four bulletins features details on company's electronic process control instruments for indicating, recording, and controlling temperature, pressure, level flow, pH, etc. Tables of specifications are included with statements of proportional band, reset and rate performance, spans and adjustability. The Swartwout Co.

305 Overheat Protection—Bulletin MOPRI-1, 8 pp, describes design and operation features of inherent overheat protectors—small devices built into electric motors to turn power off when windings get too hot. Includes photos and wiring diagrams illustrating operation. Spencer Thermostat Div., Metals & Controls Corp.

306 Graphic Instruments—Featured in 16-pp Catalog 657 is a line of graphic instruments designed to serve a variety of industrial measuring applications. Complete descriptive details on various types of recorders and accessories are included, as well as photos and ratings data. The Esterline-Angus Co., Inc.

MECHANICAL POWER TRANSMISSION

308 V-Belt Manufacture—Machines and processes used in the production of V-belts are described in 16-pp Booklet S-51106. Rubber compounding, preparation of fabric, building steps, curing and finishing. The Goodyear Tire & Rubber Co.

309 Multiple Drive Systems—Advantages of company's multiple drive system which provides simultaneous speed changes are detailed in Form F-1910. Examples of basic applications. U. S. Electrical Motors Inc.

310 Dry Fluid Drive—Illustrated Bulletin A-665 describes the new fhp Flexidyne and coupling, announced as incorporating all advantages found in the larger sizes of this dry fluid drive. Includes tables listing motor and shaft sizes with which they may be used, also starting horsepower ratings. Dodge Mfg. Corp.

311 Cylindrical Roller Bearings—Multi-Row cylindrical roll neck bearings are described in 24-pp Form 436. Contains complete engineering and technical data on cylindrical roller bearings designed for heavy-duty service in roll neck mountings in rolling mills. SKF Industries, Inc.

PUMPS, COMPRESSORS

313 General Purpose Pumps—Section B, 36 pp, describes rotary pumps for general purpose use. Explains positive displacement principle incorporated, gives suggestions for selecting proper materials of construction. Application and ordering information is provided on mounted and unmounted small pumps, large mounted pumps, pumps for operations requiring greater sealing, and large, totally enclosed models. Viking Pump Co.

314 Multi-Stage Pumps—Catalog B-100 describes company's line of vertically split case, multi-stage pumps. Design and construction features are described and performance curves given. Economy Pump Div., C. H. Wheeler Mfg. Co.

315 Continuous Flow Pump—Bulletin 30-C, 8 pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, specifications. Robbins & Myers, Inc.

316 Condensation Pumps—Eight-pp Bulletin 1403 describes company's line of condensation pumps for use in low and medium pressure-heating systems and steam-process equipment. Photos, drawings and other technical data on capacities and dimensions pertaining to construction, application and installation are included. Dunham-Bush, Inc.

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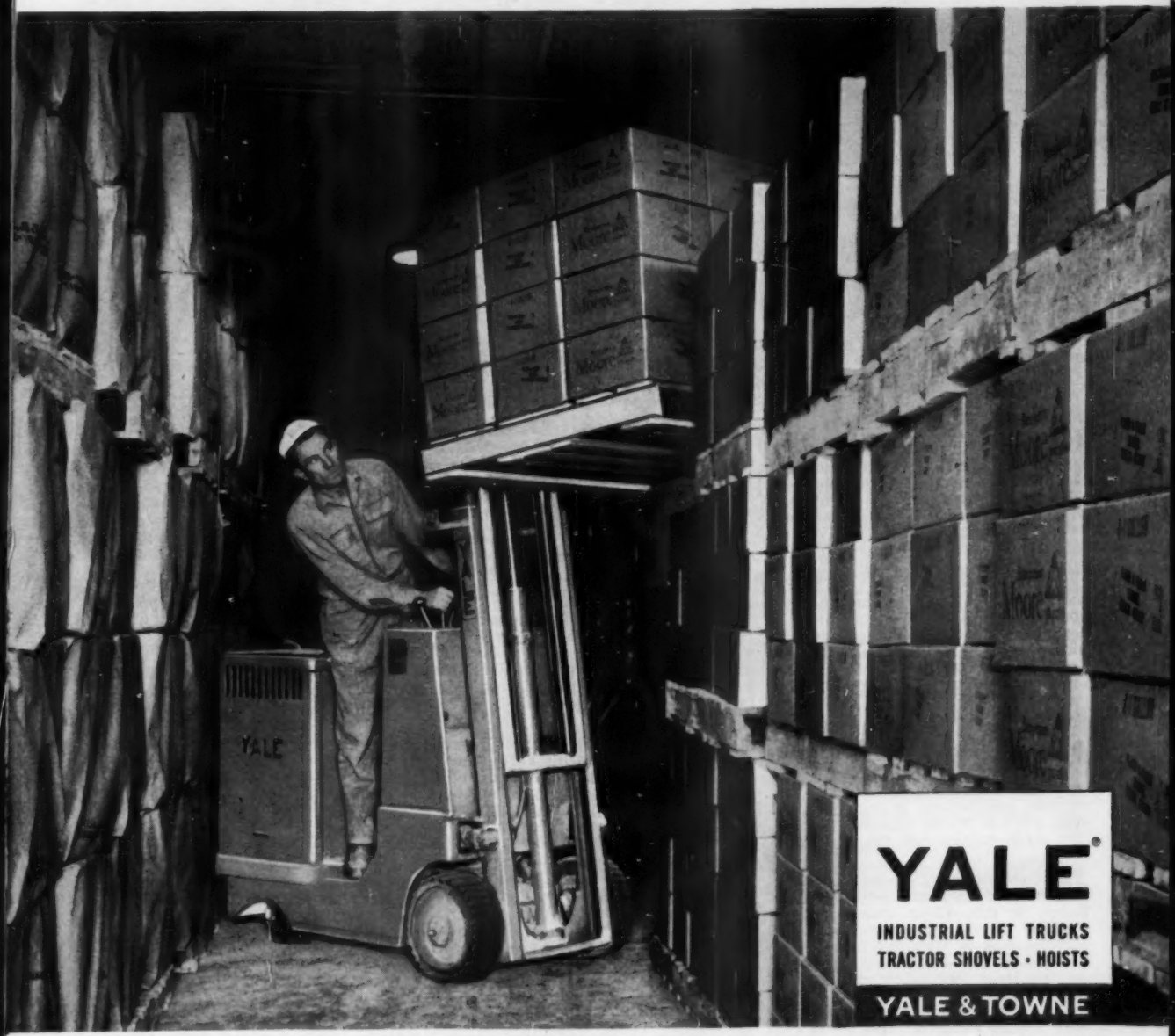

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DATA FILE

(Begins on page 182)

317 Single Suction Pumps—Ball bearing single suction pumps are illustrated and described in 24-pp Bulletin 976-G. General data and specifications are included, as well as rating tables, outline dimensions, sectional reference drawings, and other features. Buffalo Pumps, Div. Buffalo Forge Co.

318 Multi-Stage Compressors—Bulletin 150, 64 pp., presents company's multi-stage centrifugal compressors in both horizontally-split and vertically-split types. Advantages, construction features and application of each type are covered, and text is illustrated with photos and cutaways. A section of general information discusses fundamentals of centrifugal compressors and drivers for them. Clark Bros. Co.

319 Industrial Air Compressors—Advantages of company's line of industrial air compressors are detailed in 16-pp Catalog 5510. Tables indicating weights, code words and dimensions are included, as well as cutaway views showing design and operation details. Compressor specifications are given, and dimensional diagrams included. Schramm, Inc.

320 Horizontal Compressors—Eight-pp Bulletin HAC-40 describes company's Class RX horizontal, single-stage air compressors. Keyed cutaway illustrations show design and construction features. Lubrication, controls available and standard equipment are covered. Gardner-Denver Co.

321 Low Pressure Compressors—Eight-pp Bulletin A-95 describes a line of low pressure compressors for heavy duty industrial applications. Engineering design features are detailed. Joy Mfg. Co.

LUBRICATION

322 Plug Valve Lubricants—Reference Book 39—Section 5A, 16 pp, describes company's plug valve lubricants and lubrication accessories. Standard lubricant table gives detailed description and extreme temperature range of each lubricant. Homestead Valve Mfg. Co.

323 Industrial Greases—Described in Technical Bulletin 50 are a group of greases suitable for all types of industrial applications at temperatures from zero to 300 F, in wet, moist or dry surroundings. Sun Oil Co.

324 Organized Lubrication—Benefits of organized lubrication are extolled in this 24-pp bulletin. Cost control opportunities are detailed and the task of assigning responsibilities and delegating authority in an organized lubrication system discussed. Method of determining savings and setting up records to measure results covered. The Texas Co.

VALVES, TRAPS, PIPING

326 Valve Performance Facts—Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Crane Co.

327 Industrial Valves—Bulletin 507V illustrates and describes company's line of industrial valves for control of air, gas, liquids and solids. Features photos and descriptive detail on a variety of valves, including butterfly valves, wafer butterfly valves, slide valves, others. W. S. Rockwell Co.

328 Blow-Off Valves—Bulletin B 427, 20 pp, describes features and advantages of company's blow-off valves for boiler pressures up to 415 lb. Covers construction details, materials used in the valves, and includes specifications, weights and dimensions, tables of average physical and chemical properties of materials, photos of typical installations, etc. Yarnall-Waring Co.

329 Silent Check Valves—Bulletin WH-654 and Bulletin 856 feature detailed descriptive and engineering data on company's line of silent check valves for a variety of applications. The bulletins cover center guided, globe type, and a silent gas-air check valve. The Williams Gauge Co., Inc.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 177 and 178.

330 Plug-Type Valves—Long-life features of company's stainless steel plug-type valves are stressed in 6-pp Form 202-A. Cutaway view illustrates important design and operation features. Jenkins Bros.

331 Valve Lubrication—This 19-by-24-in. chart contains maintenance and lubrication information for company's lubricated plug valves. Of heavy paper with metal edges, the chart features detailed exploded views of four types of valves and includes a table of recommended lubricants for oil, water, gas and chemical service. Meter and Valve Div., Rockwell Mfg. Co.

332 Pressure-Reducing Valve—Bulletin J-160 describes features and advantages of company's pressure reducing valve for dead end shut-off and positive pressure regulation. Operation details are shown on cutaway view, and recommended capacities given on tables. Jordan Corp., Div. of OPW Corp.

333 On Steam Traps—Catalog K is an enlarged 48-pp manual and steam trap catalog. New material provided includes open float and thermostatic traps, pipe strainer to 6 in. in steel and semi-steel, and helpful steam pipe sizing tables. Discusses fundamentals of good trapping, trap selection, installation, testing, trouble-shooting, and repairs. Armstrong Machine Works.

334 Glass Pipe and Fittings—Corrosion-resistant qualities of this Pyrex brand glass pipe and fittings which make it suitable for use under corrosive conditions are described in 44-pp Bulletin PE-3. Operating temperatures, physical characteristics, installation procedures are covered and specifications and dimensional drawings given. Corning Glass Works.

335 Guide to Couplings—This 26-pp general catalog describes company's quick-connect, quick-disconnect couplings, including a coupling for high pressure applications, for impact in air lines, for low pressure applications, for vacuum and very low pressures, and difficult fluids. Snap-Tite, Inc.

336 Expansion Joints—Features and advantages of company's line of expansion joints and flexible couplings are illustrated and described in 12-pp Form AD-137. Standard dimensions and other engineering data are included. The Garlock Packing Co.

MAINTENANCE

337 Basic-Roofing Information—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses roofing practices. Johns-Manville.

338 Repairing Concrete Floors—A seven-step procedure for repairing concrete floors with non-shrink mortar is described in this folder, EPMM-4. Each step is illustrated with a photo. The Master Builders Co.

339 Urethane Coatings—The nature of urethane coatings and their advantages in industrial coating systems is detailed in this product information bulletin. Properties and typical applications are illustrated and described. Mobay Chemical Co.

CONSTRUCTION

341 Pole-Type Buildings—Easy steps in building pole-type industrial and other buildings are presented in this 8-pp pocket-size booklet. Deals with uses of pressure-treated, rot and termite resistant poles and lumber. Contains practical step-by-step guide, with diagrams, covering site location, pole setting, roof construction, splash boards, application of siding. Wood Preserving Div., Koppers Co., Inc.

342 Replacement Glazing—Twelve-pp Booklet PL-251 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical booklet gives properties of this sheet. Plastic Dept., Rohm & Haas Co.

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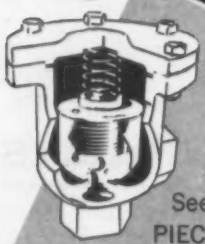

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DATA FILE

(Begins on page 182)

343 Aluminum in Colors—This bulletin introduces Alcoa's Alumalure colored aluminum architectural building sheet products, a complete line of sheet products offered in 11 colors. Five of the newly developed hues are pigmented aluminum to impart a soft, pleasing metallic appearance. Aluminum Co. of America.

344 Grating and Treads—Bulletin 2566 is a revised illustrated bulletin on grating and treads for a variety of applications. Presents descriptions of electro-forged, rivited, rectangular, diagonal, U-Type and T interlocked grating and treads. Tables of safe loads and information on specifying are also included, as well as photos of applications. Blaw-Knox Co.

345 Steel Floor Plate—Skid resistance and other advantages of USS multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, data on allowable loads. United States Corp.

346 Non-Slip Flooring—Algrip, an abrasive rolled steel floor plate described as non-slip even on steel inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features, fabricating. Alan Wood Steel Co.

347 Foundation Pipe Piles—Comprehensive information on Taylor Forge spiral-weld foundation pipe piles is presented in a 24-pp Form F-5677. In addition to detailed specifications, the illustrated booklet describes a number of pipe-pile installations and includes driving logs. L. B. Foster Co.

348 Shop Equipment—Work benches, tool stands, shelving and other pressed steel equipment for the shop, laboratory and assembly line are shown in 8-pp Form 2299. Construction features and specifications of size, top material, equipment variations. Standard Pressed Steel Co.

349 Guide to Shelving—To assist plant engineers in selecting proper shelving for all storage requirements, 64-pp Catalog 30 offers detailed suggestions for correct shelving and storing materials, loose and packed parts, record files. Shop equipment and storage cabinets are also described, and instructions included for planning and building of stockrooms. Deluxe Metal Furniture Co. Royal Metal Mfg. Co.

TOOLS, MACHINE SHOP

351 Industrial Tools—Information on a complete line of industrial tools, including 500 new types and sizes never before offered, is presented in 120-pp Catalog 57. Included are complete lines of wrenches, socket wrenches, drop forged clamps, tool holders, set up and hold down tools, cutting tools and pipe tools. Photos, drawings and numerous charts aid selection. Armstrong Bros. Tool Co.

352 Industrial Wrenches, Hand Tools—Tools for production lines, maintenance work and product servicing are featured in a 156-pp Industrial Catalog 58-I. Loaded with pictures and tool facts, book describes in detail the complete line of over 4,000 tools—including chests and rollcabs, wrenches and sockets of all types, screwdrivers, pliers, pullers, etc. Snap-on Tools Corp.

353 Portable Tools—Industrial construction and other portable power tools for the manufacturing, construction, woodworking and metal-working industries are described in this 50-pp catalog. Tools appear in logical sequence of size and duty rating. Specification tables at bottom of each page permit easy selection. Skil Corp.

354 Pipe Tools—Ordering and application information on Ridgid pipe tools is provided in 16-pp illustrated Catalog 7596R6. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives, oilers. The Ridge Tool Co.

355 Portable Electric Tools—Form 10 features a complete line of portable electric tools including drills, screw-drivers, impact wrenches, magnetic drill presses, sanders, grinders, hammers, holesaws, and forged tools. The Black & Decker Mfg. Co.

356 Electric Tools—Catalog G-6 (1), 36 pp, describes electric tools for a variety of industrial applications, including drills, grinders, hammers, nut runners, polishers, right angle drives, sanders, saws, screw drivers and others. Application photos show features, prices included. Milwaukee Electric Tool Corp.

357 Data for the Shop—"Fluids and Facts for Metal Working" is a pocketsize booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. Conversion tables, steel numbering systems, machinability ratings. Standard Oil Co. (Ind.)

358 Disposal of Waste Oils—Method of treating cutting oil emulsions before disposal is discussed in Technical Bulletin 34. Equipment for the emulsion disposal system is also described. Sun Oil Co.

SLINGS, CHAINS, WIRE ROPE

359 Sling Handbook—Form SL-3 is an illustrated 40-pp reference book covering more than 80 subjects on slings and fittings. Included in this revised edition is reference information condensed into handy chart form on sling types, dimensions and rated loads. In addition, section on sling fittings has been expanded to cover fittings not previously shown. Union Wire Rope Corp.

360 Sling Chain Handbook—Illustrated Data Book 100, 32 pp, presents "how to do it" information on sling

This Wissco Belt is used by the Bower Roller Bearing Division for heat treating bearing races and rollers. The heating cycle lasts 1½ hours at temperatures up to 375 degrees, and the belts are in constant operation.

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"A considerable percentage of our annual race and roller production passes through our draw furnaces on Wissco steel processing belts—at an annual belt cost per furnace of $333. That's real economy, considering that the belts are in operation 24 hours a day, 7 days a week."

The belts are used to transport bearing races and rollers through the furnaces at temperatures of 350 degrees to 375 degrees, the complete entrance and departure cycle lasting 1½ hours. This heat treating operation removes stress from the parts and develops uniform hardness.

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Consistent dependability . . . economy through long service life and minimum maintenance—important factors in any process conveying operation. Let Wissco Belts add these factors to *your* operation. For complete information contact the sales office nearest you.

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DATA FILE

(Begins on page 182)

chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of sling chains and attachments. Columbus McKinnon Chain Corp.

361 **Drop Forged Fittings**—Comprehensive data on company's line of drop forged fittings for wire rope and chain are presented in 40-pp Catalog 950-2. Includes specifications, dimensions, rated capacities and weights. Also announces range of sizes and capacities in many of items listed, as well as new products, including clips. Crosby-Laughlin Div., American Hoist and Derrick Co.

362 **Slings For Industry**—Bulletin 5886 describes Safe-Guard cable-laid slings, designed for applications where a soft sling body is required and where flexibility is more important than resistance to abrasion; and rope-laid slings for applications where abrasion resistance is a first consideration. Rated capacity tables included. Macwhyte Wire Rope Co.

MATERIALS HANDLING

364 **Crane System**—Twenty-pp Bulletin TRC-101 describes advantages and applications of company's Trak-Rak crane system and features typical installations in auto body handling, bar stock storage, container storage, pipe storage, pallet and skid storage, skid box storage, tote pan storage, small parts storage, others. Engineering data and dimensional diagrams. Chicago Tramrail Corp.

365 **Electric Hoists**—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data included. Wright Hoist Div., American Chain & Cable Co., Inc.

366 **Electric Hoists**—Six-pp illustrated Bulletin 905 describes R&M Type J electric wire rope hoists in capacities of ¼, ½, 1 and 2 tons. Shows complete specifications including mounting options and sectional drawing. Hoist & Crane Div., Robbins & Myers, Inc.

367 **Rugged Little Hoist**—Twelve-pp Bulletin 158-E describes the Lodestar, a light weight but heavy duty, small electric hoist with push button control. Discusses low maintenance, safety, other advantages offered, and covers design features. Specifications and dimensions are given for both single- and double-chain models and accessories are illustrated, Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

368 **Steel Conveyor Belts**—"A profitable approach to the selection of steel processing conveyor belts" is

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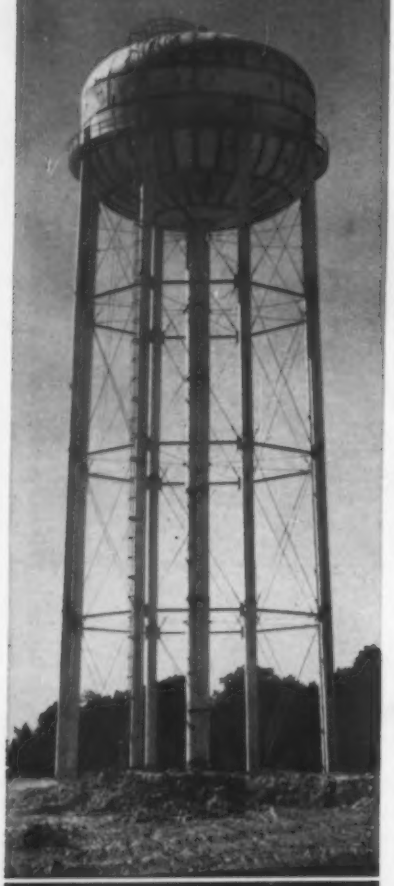

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DATA FILE

(Begins on page 182)

the subject of this 16-pp bulletin. Simplified selection, standard specifications, and installation information. The Colorado Fuel and Iron Corp.

369 Cost-Cutting Materials Handling—"The How Book of Cost-Cutting Materials Handling," is a 24-pp booklet covering various phases of the materials handling problem and their effect on industrial production. Text and pictures cover such subjects as fundamental handling motions, advantages of planned material handling practices, handling organization. The Yale & Towne Mfg. Co.

370 Casters, Wheels—This 192-pp manual, Number 60, contains detailed information on a line of casters and wheels designed for a variety of furniture and equipment applications. Dimensional data, specifications and price lists are provided for furniture and industrial casters and wheels, and photos, drawings and diagrams illustrating design and construction features are included. Darnell Corp.

FLEXIBLE HOSE, TUBING

371 Industrial Hose—Bulletin IH-10 features application and selection data on industrial hose, including braided, horizontal braided, wire braided, wrapped and braided, wire woven, smooth bore and rough bore. Descriptions of each type of hose are followed with application information and dimensional data. The Gates Rubber Co.

372 Flexible Metal Hose—Contained in this 36-pp bulletin is detailed information on characteristics and applications of company's flexible metal hose designed to serve a variety of industrial needs. Includes specifications, list of applications, and photos of the various types of hose available. Typical installations pictured. Pennsylvania Flexible Metallic Tubing Co., Inc.

373 Fittings and Tubing—Steel and zinc coated fittings and tubing are described in illustrated Bulletin SF-155. Advantages are detailed and installation diagrams are included. U. S. Hoffman Machinery Corp.

FANS, BLOWERS

375 Propeller Fans—Bulletin A-109C, 32 pp, covers company's line of propeller fans, including standard propeller, utility, cool-blast, Lo-Noise, reversible and Bi-Pass duct fans, intake air units and unit heaters. Contains new fan sizes not shown in the previous edition as well as revised air deliveries, specifications. Hartzell Propeller Fan Co.

376 Mechanical Draft Fans—Eight-pp Catalog 1361 describes centrifugal fans designed for handling abrasive gases at elevated temperatures. Complete application, performance, and

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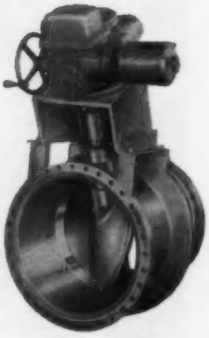
"Kwikleen" slide valve for powdered coal, granular materials, flue gases with high solids content, etc.; solids accumulations easily cleaned out by removing bottom plate.



"Stress-seal" butterfly valve for tight shut-off of hot, corrosive or dirty gases to 1300° F. and higher, at 200 p.s.i. Alloy stress band in valve body is inflated by external gas pressure to effect tight seal.

Butterfly valve with simplified bracket and linkage to air operator and valve disc positioner; provides maximum adjustment, minimizes friction, eliminates backlash, chatter and hunting, reduces power requirement in close control applications.

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Your Air Preheater engineer also makes regular calls to check the operation of every Ljungstrom – for as long as it's in service. (This now includes installations dating back to 1923.)

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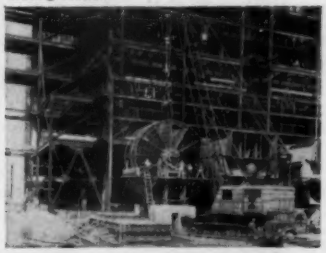
Thirty-five tons of Ljungstrom rotor being lowered into place at the new Bergen Generating Station at Ridgefield, N. J. (When the heating elements are installed the rotor will weigh 150 tons.) This is one of eight preheaters being installed by Public Service Electric and Gas Co. to serve two boilers – each evaporating 1,900,000 lbs of steam/hr. The first boiler is to be fired early next year. Anticipated preheater outlet temperature is about 275 F.

Public Service is one of the first Northern utilities to use large-size horizontal preheaters. They have nine such horizontals in operation at their Linden Generating Station and have ordered eight more for their new Mercer Generating Station.



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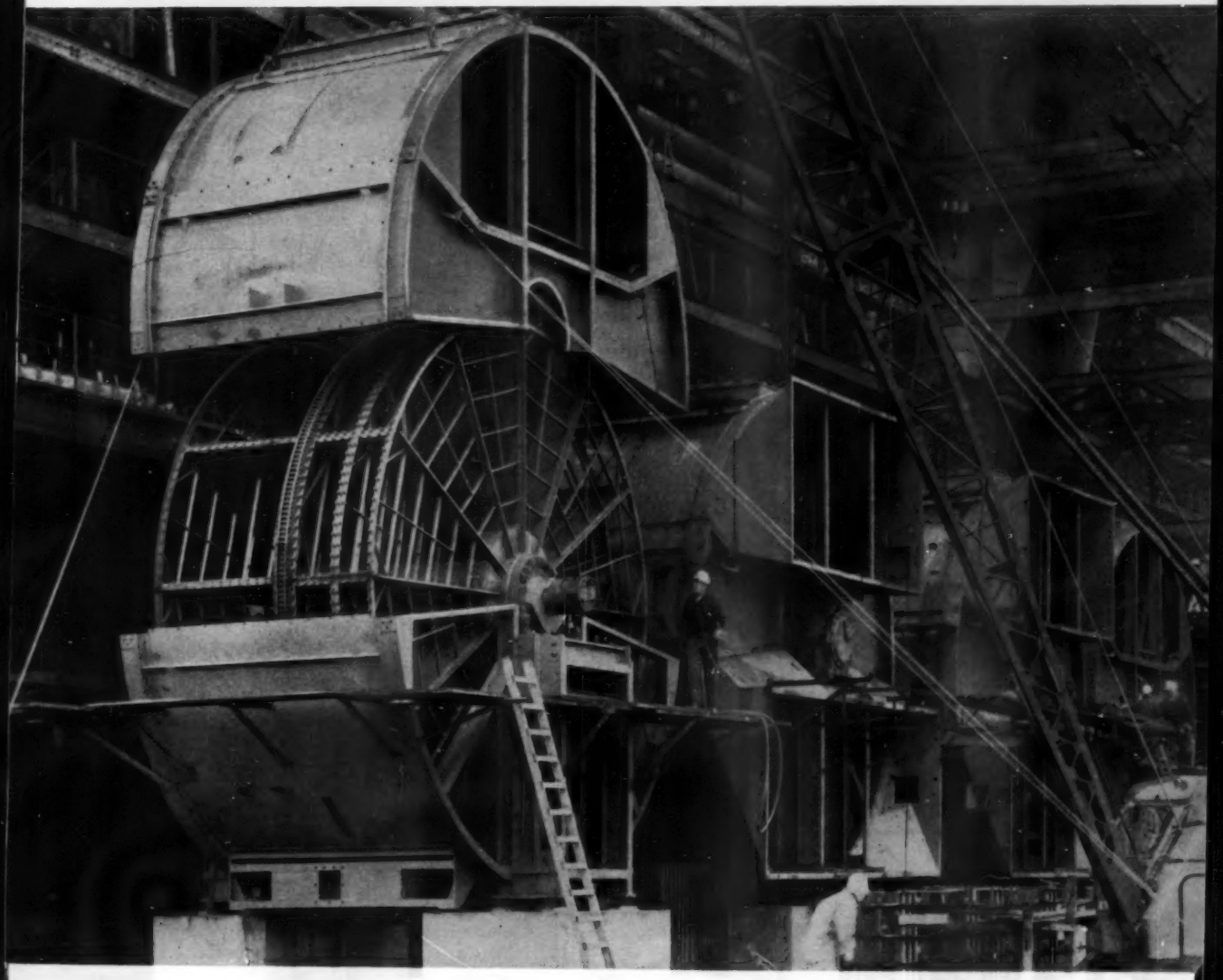

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Pole-type warehouses, factories, garages . . . almost any kind of industrial building can be erected for up to half-as-much or less, than by conventional construction methods. Savings are possible because pole-type buildings are soundly engineered and simply designed to eliminate expensive excavations, foundations and heavy pre-fabricated members.

Pole-type buildings go up quickly, easily, in days or weeks, thus providing you with the shelter you need at a minimum of the usual construction time. And they're permanent, too, with nothing to corrode or deteriorate. Maintenance over the years is negligible.

This 4½ million lb. capacity grain storage building covers over 7,000 sq. ft. It was built in 28 days by six men at a material cost of less than $1 per sq. ft.

To learn how you too can save with pole-type construction fill out and mail the coupon today.

KOPPERS **POLE-TYPE BUILDINGS**

C-13

Wood Preserving Division
Koppers Company, Inc.
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Please have a Koppers Qualified Contractor provide us with full information on pole-type buildings.

NAME_____

TITLE_____

COMPANY_____

CITY_____ ZONE____ STATE_____

For more facts circle 621 on Reply Card

DATA FILE

(Begins on page 182)

physical data are given, as well as a list of optional accessories. Sturtevant Div., Westinghouse Electric Corp.

377 Air Engineering—Bulletin E-57 is a 24-pp air engineering data file covering engineering and test facilities for propeller fans, specifications, construction, maintenance, and installation. Tables for estimating air-handling requirements, entrance and elbow losses are provided. Aerovent Fan Co., Inc.

378 Tubeaxial Fans—Performance and dimension specifications on Series 300 tubeaxial fans are presented in 8-pp Catalog 1110-B. Charts recommended stack sizes, maximum horsepower, and maximum motor speed for variable stack velocity and air flow output are included. Sturtevant Div., Westinghouse Electric Corp.

379 Industrial Fans—Bulletin 690-A, 12 pp, contains dimensions and application and performance data on direct connected fans for general and system ventilation and power roof ventilators, with air deliveries to 103,200 cfm. Design features and typical installations illustrated. Propellair Div., Robbins & Myers, Inc.

380 Induced Draft Fans—Catalog L-3 describes induced draft fans designed for any induced draft application for temperatures up to 800 F. Gives dimensions, capacities, as well as installation data. Fuller Co.

BOILERS AND GENERATORS

381 Self-Contained Boilers—Bulletin AD-162, 8 pp, describes company's complete line of self-contained boilers for heating and processing steam or hot water. Design features and advantages are detailed and a cutaway view showing flow of air in the forced draft system is included. Cleaver-Brooks Co.

382 Package Unit Steam Generators—Bulletin PSG-2 has line drawings, photos, and engineering data on portable type units from 10,000 lb/hr to 40,000 lb-hr steam capacities. These units are available in three standard pressures of 175, 250, and 375 psi. Henry Vogt Machine Co.

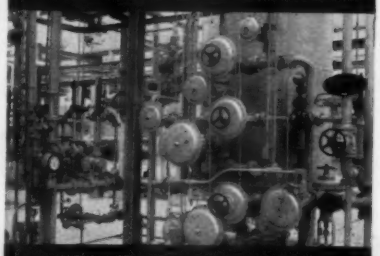
383 Boiler Construction—Bulletin BE100 describes advantages of practical boiler construction with 2 pass design, featuring comparable results with equal heating surface, but with Continental's two-pass features—turbulent spinning gas technique-uniform heating-no refractory baffles and symmetry of furnace layout. Boiler Engineering & Supply Co.

384 Decentralized Steam—Bulletin C-730 presents a case history showing how decentralized steam generation saved space, installation and operating costs at a manufacturing plant. Details briefly the function

ILLCO-WAY ionXchange

HOW TO "AUTOMATE"

BOILER FEED WATER



WITH AN ILLCO-WAY "POWER UNIT"

These pictures show an *Automatic* Mixed-Bed De-Ionizer designed for an outdoor installation at a power plant in Louisiana. The high-pressure boilers require feed water of uniform maximum purity — which this ILLCO-WAY "Power Unit" supplies *without attention* other than periodic checks of recording instruments. ILLCO-WAY "Power Units" are shipped *completely assembled*, ready for installation and hook-up.

REMOVES SILICA AND CO_2

The Mixed-Bed IonXchanger, as designed and manufactured by Illinois Water Treatment Company, is often the most economical and most reliable means for treating *any kind* of supply water to obtain the maximum purity required by modern power plants. *See your ILLCO-WAY representative for details on specific applications.*

U.S. PATENTS: 2,771,424 2,605,084

ILLCO-WAY | ILLINOIS WATER TREATMENT CO. 840 Cedar St. Rockford, Ill.

NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Can.

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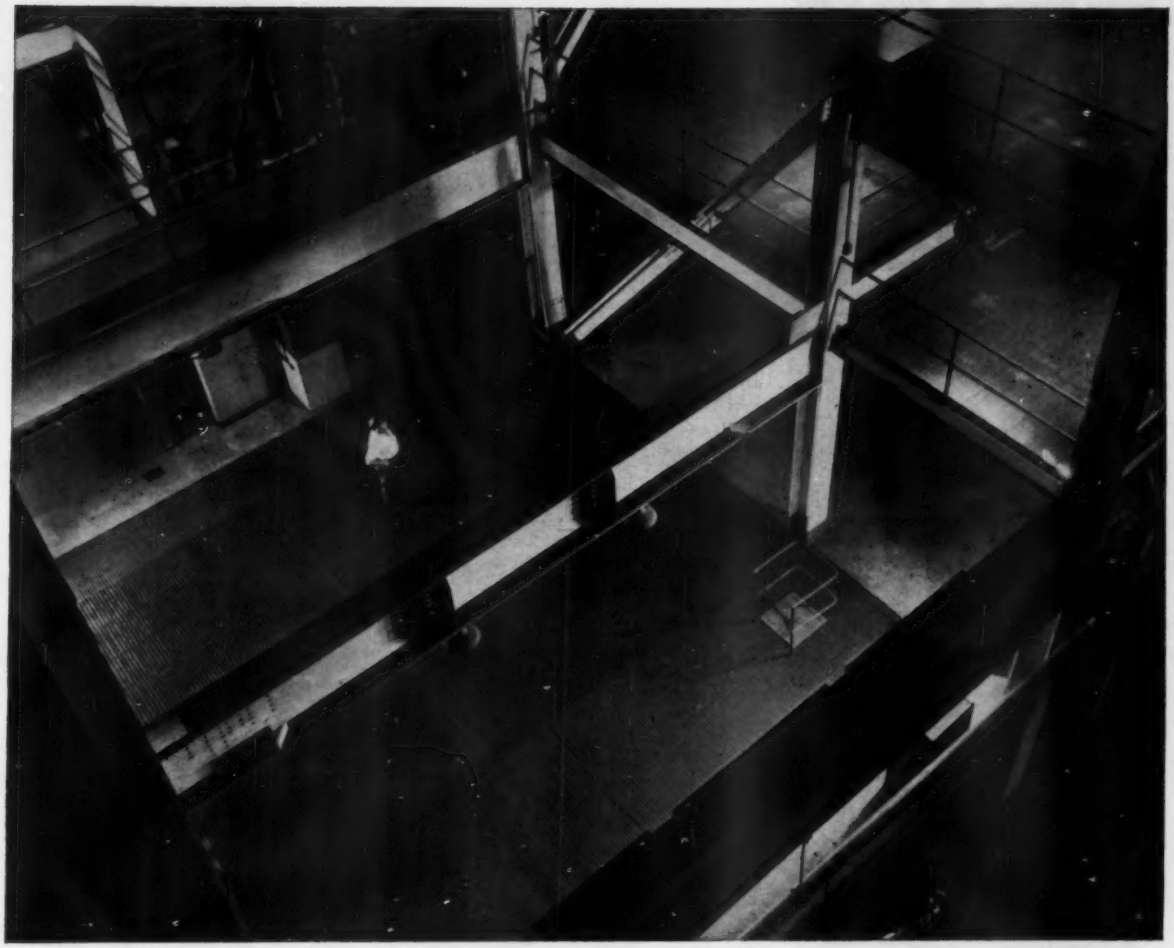

Blaw-Knox Electroforged® Steel Grating provides removable floors to simplify plant operation

Floors and mezzanines made of Blaw-Knox grating solve the problem of reaching, moving and servicing the largest types of equipment. Sections come up easily, allowing ample space to maneuver and maintain any size of machinery. Costly, time-consuming alterations are virtually eliminated.

For increased plant safety Blaw-Knox Electroforged Steel Grating provides rigid one-piece construction for sure support of the heavy loads. Non-slip cross bars and a wide variety of bearing bars assure safe walking and climbing — even under the most hazardous working conditions.

Because there's nothing to wear, or patch, nothing to catch and retain dirt, upkeep becomes easy and economical. And grating's maximum open area admits more air and light, makes brighter, better-ventilated plants.

Blaw-Knox Electroforged Steel Grating for walkways, stair treads and floors is fabricated to meet your specific operating needs. For new ideas about a complete line of space saving grating, write for Bulletin 2527 featuring grating and treads.

BLAW-KNOX

BLAW-KNOX COMPANY

Equipment Division
Dept. H, Pittsburgh 38, Pennsylvania

For more facts circle 623 on Reply Card

ERIEZ

ALL NEW "Series 16" permanent

PLATE MAGNETS

are

16 WAYS BETTER!

Tests prove NEW "Series 16" magnets with greater magnetic strength stop tramp iron cold! New heavy duty aluminum cover increases rigidity, prevents pilferage and disassembly with subsequent loss of magnetic power. Choose from many models and strengths . . optional face plates for abrasive, corrosive or sanitary uses; liquid or dust-tight applications. It's a fact: "Series 16" magnets, with 16 superior features, provide ultimate operating advantages at price of ordinary magnets!

GET 6-PAGE FACT-FILLED FOLDER. WRITE TO Eriez Mfg. Co., 71-N Manet Dr., Erie, Pa.

ERIEZ

For more facts circle 624 on Reply Card

DATA FILE

(Begins on page 182)

of each of six steam generators in providing for space and process heating. Clayton Mfg. Co.

WATER TREATMENT

385 Products and Services—Bulletin GSP-901 24 pp, describes products and services of this company and its various divisions. These include ring balance instruments, components for control systems, electronic devices, force measuring devices, water and steam treatment, others. Hagan Chemicals & Controls, Inc.

386 Ion Exchange Controls—Six-pp Bulletin E-156 describes automatic controls for ion-exchange equipment. Various elements in the control cabinets, as well as all the power-operated units, are covered and construction features are detailed. Illinois Water Treatment Co.

HEATING, VENTILATING AND AIR CONDITIONING

388 Unit Heaters—Catalog 158, 28 pp, contains performance and application data on company's line of unit heaters, including design and construction details, dimension diagrams, and tabulated information on steam capacities, conversion factors, hot water capacities, performance factors. Modine Mfg. Co.

389 Industrial Heaters—Advantages and features of a line of industrial heaters for space heating, drying, make-up air and oven applications are detailed in this illustrated bulletin. A cutaway view points out essential design features, and tables of dimensional data and engineering data included. Lennox Industries, Inc.

390 Electric Heat, 101 Ways—Principal industrial heating applications and methods are described in "101 Ways to Apply Electric Heat," a 32-pp booklet. Illustrated case histories show how metal-sheathed electric heating units are being used. Physical aspects of installation are detailed along with a discussion of the problem, solution and advantages. Edwin L. Wiegand Co.

391 Heating and Ventilating—Company's "comfort curtain" principle of heating and ventilating is described in this 8-pp bulletin. Advantages are detailed and typical installations pictured through drawings and photos. Lennox Industries Inc.

392 Heating, Air Conditioning — Featured in 20-pp Bulletin B-151A is company's line of air conditioning and heating equipment. Illustrated and described are air conditioning units, convector radiators, perimeter heating, hot water heating equipment, heating system controls, and unit heaters. Dimensions, ratings and performance data are included. Warren Webster & Co.

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electric hoist

now... important new models

LARGER CAPACITY

FASTER SPEEDS

GREATER SELECTION... from a complete range of capacities and speeds ...1/8 to 2 tons and 8 to 60 fpm.

Here's your opportunity to slash lifting and handling costs. Put these new Lodestars to work where their increased speeds and capacity match your maximum requirements.

LODESTAR FEATURES INCLUDE:

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CM HOISTS

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How to get more service than you bargain for

Specify rubber maintenance products made of Du Pont neoprene or HYPALON . . . they often outlast ordinary rubber goods. For example:

Neoprene transmission belts withstand high-speed flexing, resist heat and oil, have outlasted other belts 3 to 1.

HYPALON coated nylon tarpaulins will not crack or dry out; highly resistant to abrasion and cutting, yet ⅓ the weight of conventional tarps.

Neoprene conveyor belting carried molten sand and metal fragments for 1 year; other belts last 90 days.

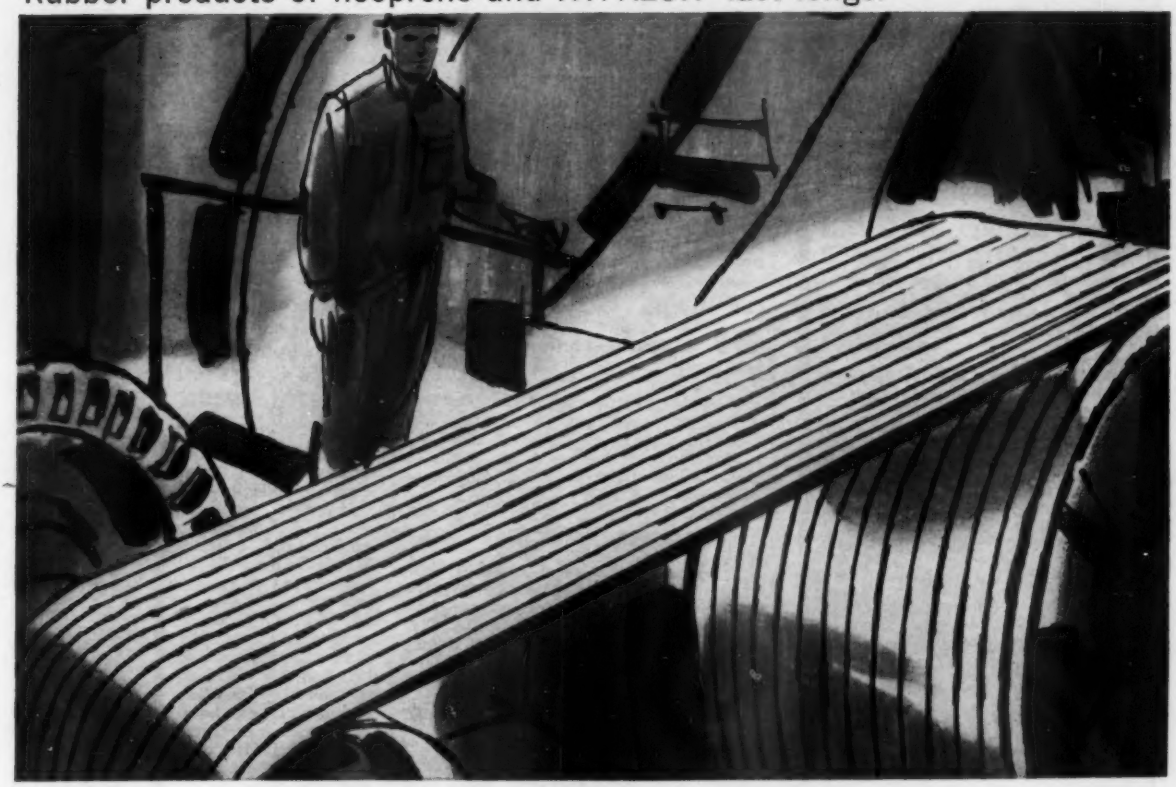
HYPALON hose has carried hypochlorite since May, 1954; ordinary hose broke down in a few months.

This means longer service per dollar, reduced replacement cost and savings in downtime.

Wherever you use maintenance goods of neoprene and HYPALON you are assured of durability, and excellent resistance to a wide range of deteriorating factors. Neoprene, a versatile synthetic rubber, offers good oil, weather and abrasion resistance. HYPALON is a special-purpose synthetic rubber, ozone-proof and impervious to most oxidizing chemicals.

Your local rubber goods distributor handles neoprene and HYPALON maintenance products and can recommend the right product to meet your needs. Take advantage of his knowledge and service by calling him soon. For additional information write for DU PONT ELASTOMERS IN INDUSTRY, E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. PE-1, Wilmington 98, Delaware.

Rubber products of neoprene and HYPALON® last longer



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SYNTHETIC RUBBER

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

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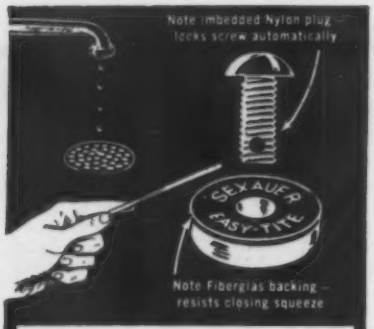
Note imbedded Nylon plug — locks screw automatically
SEXAUER
EASY-TITE
Note Fiberglas backing — resists closing squeeze

NEW WAY TO

Prevent Faucet Leaks!

★ **9 out of 10 washers are fastened with screws that are TOO LONG or SHORT. The screws quickly loosen; the loosened washers are destroyed thru grind and squeeze of opening and closing faucets.**

34 years of research uncovers new solution

★ **Now, NEW (Patented) 'Sexauer' SELF-LOCK Monel screws, with an imbedded expanding NYLON PLUG, lock at the required depth AUTOMATICALLY, hold washers FIRMLY! Made of rustproof, non-corroding Monel, heads don't twist off, screw slots don't distort. They are easily removed when necessary, can be re-used repeatedly.**

★ **Used with NEW 'Sexauer' EASY-TITE faucet washers, they make a combination that outlasts past faucet repairs "6-to-1"! EASY-TITES are made of super-tough, pliable du Pont compound (neither rubber nor fibre) and reinforced, like a tire, with a vulcanized layer of Fiberglas. They resist distortion and splitting from shut-off grind and squeeze.**

Hidden costs of faucet leaks!

Faucet leaks are costly! As authenticated by Hackensack, N. J. Water Co. and American Gas Association, stopping just ONE PIN-HOLE SIZE (1/32") LEAK can reduce water waste 8,000 gal. quarterly. If a HOT WATER FAUCET LEAK, water and fuel savings JUMP to over $7.58 QUARTERLY—plus additional savings on MATERIALS, LABOR and costly FIXTURE REPLACEMENTS!

NEW SELF-LOCK screws and EASY-TITE faucet washers are just TWO of the "SEXAUER" line of over 3000 TRIPLE-WEAR plumbing repair parts and Pat'd. precision tools.

A "SEXAUER" Technician in your vicinity will make our NEW 126 page Catalog "H" available. He will gladly consult with you regarding a SURVEY of your plumbing fixtures to determine correct repair parts required and establish reasonable stock levels that avoid both overstocking and shortages—thus providing for efficient stock arrangement and control—all without obligation. WRITE TODAY!

J. A. Sexauer Mfg. Co., Inc., Dept. S-19
2503-05 Third Ave., New York 51, N. Y.

Gentlemen: *Please send me a copy of your NEW, 126 page catalog "H."*

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SEXAUER

WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

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DATA FILE

(Begins on page 182)

393 Plumbing, Heating Supplies—Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and illustrated, the catalog gives detailed information on uses. J. A. Sexauer Mfg. Co., Inc.

394 Sectional Condenser — Lower operating costs, simpler upkeep and other advantages of company's Aeropass sectional condenser are stressed in Bulletin 131. Construction features and operation of unit are illustrated. Text explains how unrestricted air travel and Duopass pre-cooling afford low power cost. Niagara Blower Co.

LIGHTING

395 Illumination Design Data—Basic reference data on interior lighting installations is contained in 48-pp Manual A-4854, which features a section describing footcandle levels required for each group of seeing tasks. These footcandle levels are then related to many kinds of rooms. Westinghouse Electric Corp.

396 Incandescent Lighting—The 24-pp "Incandescent Lighting Guide Book" features sections on the general advantages of incandescent lighting, the history of incandescent lamp developments, and includes chapters on basic types, bulb shapes, sizes, glass types and finishes, and bases. Sylvania Electric Products Inc.

397 Architectural Floodlighting — Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose heavy-duty floodlights. General Electric Co.

398 Industrial Lighting Fixtures—Design and construction features and performance advantages of industrial lighting fixtures for Power-Groove lamps are detailed in 8-pp Form OD-685. Tables giving coefficients of utilization are included, as well as installation information. Day-Brite Lighting, Inc.

ELECTRICAL

399 Fan-Cooled Motor — Illustrations and description of company's totally enclosed fan-cooled electric motors are featured in Bulletin 827. Cutaway views show features. Brook Motor Corp.

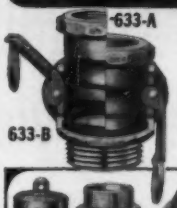
400 Electrical Wires, Cable—Bulletin 1105, Section 1, 16 pp, features a cable selection chart and complete engineering information on company's line of electrical wire and cable. Advantages are detailed. The Okonite Co.

401 Secondary, Service Cable—Bulletin RCP-361, 8 pp, on neutral-supported secondary and service drop

OPW **KAMLOK**

QUICK COUPLERS

The Fastest, Safest, Surest Coupling Known



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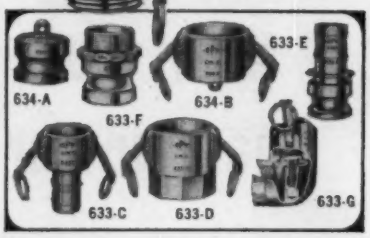
NEVER FAILS
HOLDS TIGHT



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All styles of adaptors fit in all styles of couplers of the same size.

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ARMSTRONG BROS.

Better PIPE TOOLS

This light (26 lb.) compact Portable Power Pipe Threader, goes to the job—is operated with a ½" portable electric drill. 1 set of High Speed Steel Chasers do all sizes—just move indicator to 1", 1¼", 1½", or 2" marking. Clamp on pipe and apply drill to drive square. The rest is automatic. Operating on anti-friction bearings with automatic lead, it's a fast, easy way to get smooth, accurate threads.

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ARMSTRONG BROS. TOOL CO.

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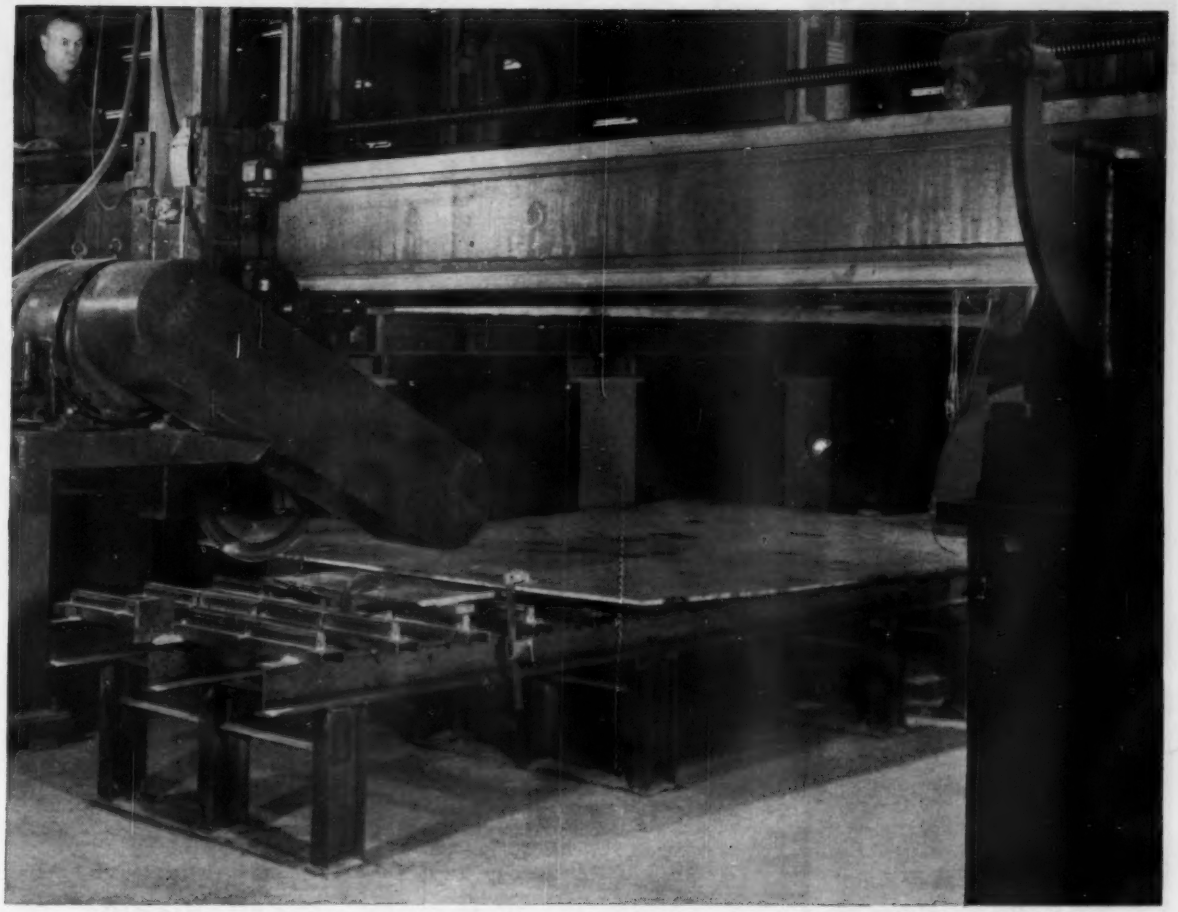


This special Ryerson saw assures square, parallel cuts and smooth edges on stainless plate . . . width and length tolerances ± 1/32"

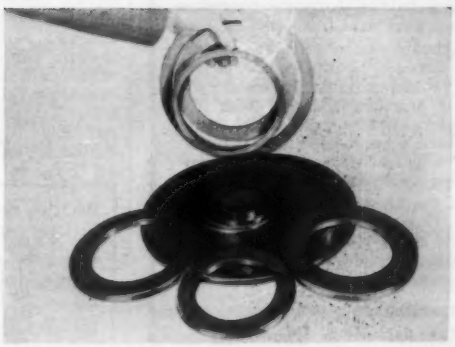
The plus you get when it's stainless from Ryerson

WIDEST SELECTION—No other source comes close to offering a comparable range of stainless types, shapes and sizes—so you can always get exactly what you need.

UNIQUE SERVICE—Big-capacity abrasive saw assures the ultimate in cutting accuracy . . . and shearing, hack-sawing and flame-cutting facilities also meet exacting requirements.

EXPERT TECHNICAL HELP—Ryerson specialists are always ready to work with you on any problem of stainless selection and fabrication.

No wonder more people buy stainless from Ryerson than from anybody else.



Machine-cut stainless rings and discs from Ryerson are *finished* parts to your specifications, priced below your own costs.

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Principal Products: Carbon, alloy and stainless steel,—tubing, bars, structurals, plates, sheets,—aluminum, industrial plastics, metalworking machinery, etc.

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Years of experience are packed into this new 6-article series — each an invaluable guide for keeping commutators and slip rings at peak performance.

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DATA FILE

(Begins on page 182)

cables, provides specifications for both types, including scope of use, conductors, insulation, construction, tests and put ups. Charts show number of strands, insulation thickness, size and type of messengers, current carrying capacity. Rome Cable Corp.

402 **Motor Control Centers**—Maximum protection motor control centers with circuit isolation are described in this 33-pp technical design data book. Advantages and features are detailed and technical data required to engineer and specify the motor control centers are included in special fold-out sections which include typical specifications, cell layout tables, starter data, wire tables, and typical cell arrangements. Northeastern Engineering, Inc.

403 **Low Voltage Switchgear**—Bulletin 6004-C, 20-pp, discusses advantages of company's line of low voltage switchgear. Includes application and selection data, curves showing short circuit currents in low voltage systems, and detailed specifications and typical switch gear assembly. I-T-E Circuit Breaker Co.

404 **Enclosed Switches**—Catalog 83, 20 pp, Catalog 84, 16 pp, and Catalog 101, 24 pp, describe enclosed switches for industrial uses. Included are general switches designed for use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

405 **Protective Relays**—Featured in 16-pp Catalog 5-020 are time delay overcurrent relays, directional inverse time overcurrent relays, differential relays, instantaneous overcurrent relays (adjustable setting), inverse time voltage relays, auxiliary relays, ac-dc definite time relays, and reclosing relays. For each model, tabular data and photos cover its applications, features, design, settings. Federal Pacific Electric Co.

Reader Service Cards for ordering bulletins are on pages 177-178. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

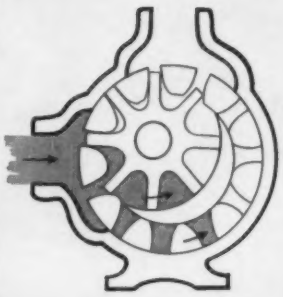
406 **Hydraulic-Magnetic Breakers**—Bulletin 301, 16 pp, describes advantages and operation of company's hydraulic-magnetic circuit breakers. Design and construction features are detailed and time-delay curves, specifications and dimensional data included. Heinemann Electric Co.

407 **Distribution Equipment** — Detailed information on company's line of electrical distribution equipment is

WHY

are Viking rotary pumps

BETTER?



BECAUSE

they are Mechanically Superior

The Viking "gear-within-a-gear" pumping principle makes liquids flow into and through the pump, changing direction ever so slightly until liquids are trapped. This action cuts turbulence, foaming, cavitation and power consumption to a minimum. As a result, liquids are delivered in a smooth, positive flow . . . free of aeration.

TESTED

In test after test the superiority of Viking's pumping principle has been proved over other rotary pump action . . . and even more pronounced when handling fluids of 750 SSU and thicker. Learn the complete story on Viking rotary pumps. Send for free catalog 59SZ

VIKING Pump Company
CEDAR FALLS, IOWA, U.S.A.
In Canada it's "ROTO-KING" pumps
See our Catalog in Sweet's Plant Engineer's File

For more facts circle 632 on Reply Card

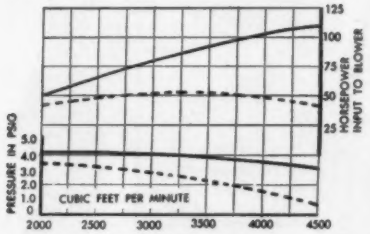
The Use Of Air Offers Great Prospects For Increasing Industry's Productive Capacity

—Thomas Alva Edison

Today, when much is being written on the necessity of reducing overhead, it is significant that custom engineered air equipment is leading the way to increased plant efficiency and lower operating costs. For example, in delivering clean, dry air or gas continuously at constant pressure, Hoffman Multistage Centrifugal Blowers and Exhausters and Hoffman Positive Displacement Cycloblowers are at work handling a wide variety of products. These range from the crating of fragile eggs to the rugged service demands of Pneumatic Conveying.

Efficiency and Adaptability

Hoffman Centrifugal Blowers and Exhausters furnish pressures up to ten pounds per square inch or vacuums up to 12 inches of mercury with volumes to 20,000 cfm. By varying the number of stages and utilizing different types of impellers, various ratings and operating characteristics can be obtained. Centrifugal Units are furnished with radial or backward curved impellers or combinations of these types to satisfy individual process requirements. The performance characteristics of these impellers are illustrated in Graph "A".

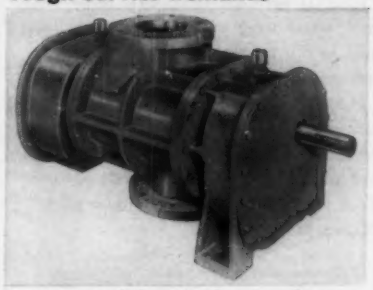


Graph A

The radial impeller has a relatively flat pressure characteristic throughout its volume range. A backward curved impeller differs from the radial impeller in that it falls off in pressure as volume increases. The graph shows that the horsepower requirement of the backward curved impeller reaches a maximum and then falls off to provide a non-overloading characteristic. Economy of operation is assured since power is consumed only in proportion to the actual air or gas volume handled. The absence of any internal wearing surfaces and the lubrication of bearings in outboard mounted housings makes it impossible to contaminate the air or gas handled.

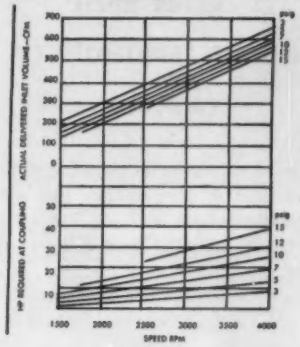
Send for Bulletin AB-104.

Cycloblower Meets Tough Service Demands



Designed for similar tough service demands, the Hoffman Cycloblower is a compact axial flow, Positive Displacement Blower/Exhauster incorporating perfectly symmetrical rotor forms. Interruption of the continuity of rotor seals without sacrifice of the advantages of such forms allows increased water rates for wet compression and vacuum service. Shock, temperature and loading due to build up of pressure is effectively eliminated. The Cycloblower has a normal operating range up to 15 lbs. per square inch and 15 inches of mercury with dry compression. With water injection, vacuums of 22 inches of mercury and pressures of 30 lbs. per square inch can be obtained. Volume capacities range from 80 cfm to 3500 cfm.

A Positive Displacement Unit is a constant volume machine, whereas a Centrifugal is a variable volume machine. In Graph "B" it will be noted that at a constant RPM, the Positive Displacement Blower/Exhauster can deliver pressures from 3 to 15 lbs. If a unit is selected to operate at 500 cfm and 3 psig, it will have to operate at approximately 3050 RPM and require 8 HP. Should changes in the process require more pressure, the Positive Displacement Unit will automatically build up to the required pressure while still maintaining constant volume. It will, of course, require the additional horsepower as indicated in the graph. A pre-set relief valve acts as a built-in safety device. It limits the amount of pressure which can be built up when the requirements of the system exceed the capabilities of the equipment. Lubrication within the compression chamber is unnecessary since the rotors do not touch. The possibility of oil contamination is thus avoided in the same manner as it is in the Hoffman Centrifugal Units.



Graph B

Send for Bulletin CB-157.

Wide Performance Range

Centrifugal and Positive Displacement Units have an overlapping range of performances. Without cost or obligation Hoffman engineers will recommend the most efficient units for your particular requirement. Whatever your problem, feel free to call on Hoffman's quarter of a century of engineering experience and background to meet your special needs. Send now for these free helpful booklets.

Kindly send the following FREE booklets.

U.S. HOFFMAN MACHINERY CORPORATION

Air Appliance Division Dept. PE-1
103 Fourth Avenue
New York 3, N. Y.

☐ AB-104 — How Multistage Centrifugal Blowers & Exhausters save on production costs.

☐ CB-157 — How Cycloblowers can help increase production.

NAME..... TITLE.....

COMPANY.....

ADDRESS.....

For more facts circle 633 on Reply Card

This Self-Contained Fluid Cooling System

... gives most accurate temperature control

Applied in cooling industrial machines or processes to temperatures approaching the ambient wet-bulb, the NIAGARA *Aero* HEAT EXCHANGER is independent of any more than a nominal water supply or disposal. The coolant system is a closed one, free from dirt and maintenance troubles.

Heat is removed from your process *at the rate of input,* giving you precisely the temperature you require and assuring the quality of your product. Heat may be added to prevent freezing in winter or for better control in a warm-up period. Liquids or gases are cooled with equal effectiveness.

Heat is rejected outdoors. Only the little water evaporated on the cooling coils in the air stream, or discharged to prevent hardness build-up, is consumed.

Niagara sectional construction saves you much installation and upkeep expense, gives full access to all interior parts and piping. Your equipment always gives you full capacity and "new plant" efficiency.

Write for Niagara Bulletin No. 132 for complete information

NIAGARA BLOWER COMPANY

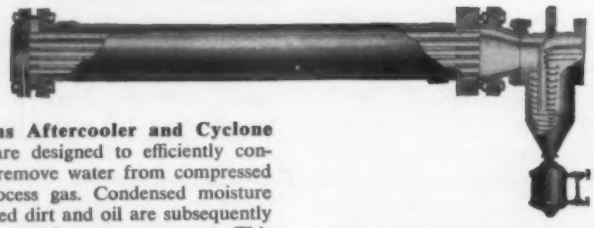
Dept. PE-1 405 Lexington Ave., New York 17, N.Y.

District Engineers in Principal Cities of U. S. and Canada

For more facts circle 634 on Reply Card

Aftercooler and Cyclone Separator designed for cleaner, dryer compressed air

R. P. ADAMS CO., INC.
254 East Park Drive, Buffalo 17, New York



The Adams Aftercooler and Cyclone Separator are designed to efficiently condense and remove water from compressed air and process gas. Condensed moisture and entrained dirt and oil are subsequently removed in a cyclone type separator. This unit is scientifically designed for maximum removal efficiency over a wide range of flow rates.

For normal use, units are available to cool gases to within 10° F of the temperature of the cooling water. Specially designed units are available to permit a 2° F approach to cooling water temperature, for application where low moisture content is critical.

Adams Aftercoolers and Separators are available from stock to handle 20 - 40,000 cfm with 10° cooling and 25 - 19,200 cfm where it is necessary to cool within 2°F of the cooling water. Special units can be supplied to suit an unlimited range of requirements. In all cases the maximum pressure loss at rated capacities is ½ psi.

This wide range of sizes enables the economical utilization of Adams Aftercoolers and Separators in virtually all industrial application. For further information on how R. P. Adams' units will solve your compressed air problems and save you money, write today for Bulletin 711.

For more facts circle 635 on Reply Card

DATA FILE

(Begins on page 182)

presented in this 82-pp '58 Marketeer, Catalog M-158. Among equipment described are Electrostrip multi-outlet assemblies, switches, lighting panelboards, power panelboards, switchgear assemblies, and various types of electrical duct. Tables of essential data. BullDog Electric Products Co., Div. I-T-E Circuit Breaker Co.

408 Electrical Equipment Digest— Electrical equipment illustrated and described in 160-pp Catalog Digest 141 includes load centers, circuit breakers, low voltage control, fusible service equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters. Square D Co.

409 Electrical Equipment — Condensed Catalog No. 5 contains 48 pp of descriptive data on company's line of electrical products, including conduit bodies, conduit fittings, connectors, ground fittings and EMT fittings. Dimensional data and features are shown. Gedney Electric Co.

410 Protective Equipment Guide— Form SPD is a 24-pp handbook on selection of protective devices for electric circuits, motors, appliances and apparatus, and is based on 1956 National Electrical Code. Besides providing suggestions on how to se-

FREE easy-to-use guide simplifies and improves your industrial customers' track maintenance.

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L.B. FOSTER CO.

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Chicago 4 Houston 2 Los Angeles 5

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There's just no other way to *see for yourself* the latest developments in the air treating industry.

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480 Lexington Avenue, New York 17, N. Y.

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DATA FILE

(Begins on page 182)

lect right kind of protection, booklet provides wiring diagrams, motor tables. Bussmann Mfg. Co.

411 Flexible Electric Conduit—Performance and application data on company's line of flexible electrical conduit are featured in this illustrated brochure. Specifications and ordering data. Electri-Flex Co.

412 Condulet Breathers, Drains—Bulletin 2702 describes condulet breathers and drains designed to remove moisture from electrical systems. Explains how breathers and drains add to life of explosion-proof equipment. Crouse-Hinds Co.

413 Wiring Devices—Catalog 60, about 80 pp, presents ordering data on wiring devices including a wide range of switches, convenience outlets, lampholders, fluorescent devices, cord connectors, adapters, wall plates, accessories etc. Fully illustrated with photos, catalog provides condensed information on feautres, dimensions, applications. Pass & Seymour, Inc.

414 Commutator Maintenance—This commutator and slip ring maintenance data file contains information on methods and procedures for more efficient commutation. Individual bulletins cover brushes, sparking, picking, dragging and other troubles, maintenance tools and how to use them, trouble shooting chart and safety. Ideal Industries, Inc.

415 Fuses for All Uses—This revised edition of manufacturer's complete line, Folder 3, includes illustrations and descriptions of fuses for every purpose. Features dual-element cartridge fuses for time-lag in protection against overloads, and delay renewable fuses and renewal links. Economy Fuse & Mfg. Co.

416 Testing Instruments—Bulletin 19-58, 16-pp, features company's electrical testing instruments, including ohmmeters, ground testers, dielectric test sets, motor, rotation tester, cable fault locating equipment, transformer turn ratio test sets, corona test equipment, frequency meters, tachometers, other. Includes photos and descriptions of each type, including chief features. James G. Biddle Co.

418 Battery Service Tips—Latest information on industrial batteries on cycle service, including industrial truck units, is provided in the new edition, about 40 pp, of company's industrial battery service manual. Includes photos, charts, tables, repair methods, maintenance, and salient points on operation, instructions covering repairs. C & D Batteries, Inc.

419 Cable Troughs—This 12-pp catalog offers a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings, horizontal elbows, inside and outside vertical el-

"OG" SERIES

LENNOX

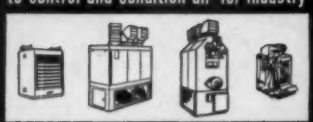
brings a *New Era* to Industrial Heating

- One Unit for Space Heating, Ventilating, Make-Up Air, Oven Applications and Drying
- Gas, Oil or Combination Burners
- Automatic or Manual Fuel Selection

Never before has one heater handled so many jobs so well, at such a sensible cost.

Completely proven and tested, the "OG" series can be used as a central system . . . with ducts . . . or as a unit heater. Installation may be horizontal, vertical, suspended or floor mounted. Dynamically balanced blower delivers a huge volume of air . . . with super-quiet action. But this just begins the "OG" story . . . write for full specs . . . see for yourself how Lennox has made the basic change in industrial heating.

LENNOX "Task Matched" Equipment to control and condition air for industry



64,000 to 2,000,000 Btuh Units

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Des Moines, Ia.

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Company_____

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For more facts circle 637 on Reply Card

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An ideal application for this 30 HP Brook Totally Enclosed, Fan Cooled, Slip Ring Motor—built to resist heat or cold, dust, fumes, moisture. It is driving an induced draft fan handling washed flue gas and raw air at 350°F. in an American Incinerator Corp. system processing municipal waste. Brook A.C. Motors are winning praise in every industry for dependable service and overall economy. They can save for you! Warehouses, Sales Representatives, Dealers throughout the country. Send for literature.

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PAGE will help you to choose the RIGHT fence for YOU from a wide variety of fence styles and four superior fabric materials—including the new ACCO Aluminized Fabric. For information and name of nearest Association member, write for Folder DII-26.

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For more facts circle 639 on Reply Card

DATA FILE

(Begins on page 182)

bows, ties, crosses, covers and many special devices. The Globe Co.

420 Cable Supports—This information folder contains data on company's cable supporting equipment, telling how to install cable supports, giving advantages of cable trough. T. J. Cope Div., Rome Cable Corp.

STORAGE TANKS

422 Steel, Alloy Fabrication — All types of steel and alloy tanks and vessels fabricated by the company are described in this illustrated bulletin. Shows installations in a wide range of industries, including petroleum, chemicals, steel and atomic energy. Graver Tank & Mfg. Co., Inc.

423 Tripod Elevated Tank — This illustrated bulletin describes the Horton tripod elevated water tank, designed to provide economical gravity water pressure for general service and fire protection in private water systems, others. Standard sizes included. Chicago Bridge & Iron Co.

FILTRATION

424 Filtration Equipment — Eight-pp Bulletin GEO-506 describes filtration equipment for micronic clarification of all types of fluids; lubricating and fuel oils; liquid chemicals and petro-chemicals; compressed air, carbon dioxide, and other gases; hydraulic fluids; electroplating solutions; coolants. Commercial Filters Corp.

425 Pipe Line Filters — Eight-pp Bulletin 200 contains detailed information on pipe line filters for air and other gases. Double action principle which gives sustained, trouble-free operation at high load factors is illustrated and explained. Specifications are included. Dollinger Corp.

OTHER EQUIPMENT

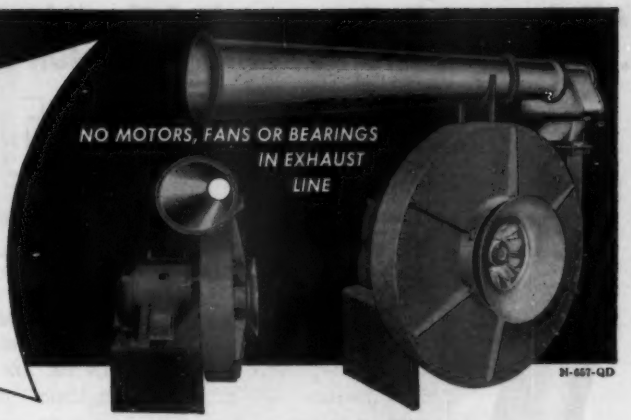
426 Industrial Finishing Equipment —Catalog A 657, 12 pp, describes a complete modern finishing system for cleaning, rust proofing, drying, painting and finish baking. The R. C. Mahon Co.

427 Brinemaking Manual — Details on modern brine-making methods and equipment are presented in 12-pp Manual 135. Three types of brinemakers are described, as well as a wet salt storage system, and cutaway views are included. Morton Salt Co.

428 Energy in Color—Again available to plant engineers is this manufacturer's 24-pp booklet on color dynamics—the utilization of energy in color to promote industrial efficiency. Illustrated in full color, this book discusses color in general, its effect on human behavior, good seeing conditions, etc. Also describes benefits of color in industry. Illustrations show color dynamics in general plant areas,

Now . . .

you can reduce bulk materials handling costs with *Quickdraft* high pressure exhausters



FOR MOVING:

Cement, Sand, Iron Oxide, Wheat, Corn, Salt, Limestone, Castor Beans, Knots, Blocks, Paper, Wool, Cotton, Oats, Rags, Rubber, Vegetables, Coal (Powdered), Shavings, Cork, Sawdust . . . **and any other materials that can be moved by air!**

IMPORTANT NOTICE

For resisting abrasive action, Quickdraft units can be rubber lined. For withstanding corrosive gases, all Quickdraft units are available in standard acid resisting vitreous enamel, No. 316 Stainless Steel, rigid plastics (PVC), and with plastic and Fiberglas coatings.

Time and maintenance savings usually pay for Quickdraft high-pressure exhausters in 6 to 18 months on materials handling jobs. Because material does not pass through blower, maintenance is negligible. Downtime for cleaning and replacing fans, motors and bearings is eliminated. Quickdraft units are also ideal for exhausting paint spray, abrasives, corrosive gases, noxious fumes and high temperatures. For Quickdraft engineering data on materials handling, industrial exhausting, heating plant venting, write today!

Patent Nos. 2,722,372 and 2,855,874. Other Patents Pending.

Typical Example: Performance specifications for three Quickdraft Materials Handling Units using same size blower, pulling through 100 ft. of pipe the same diameter as Quickdraft. (Models range from 4 in. to 30 in. diameter—with 1/6 to 600 H.P. motors—with negative static pressures from ¼ in. to 60 in. W.G.)

Quickdraft corporation

P.O. Box 87-P • Canton 1, Ohio

Well known for power draft units for all types of heating plants.

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RUBBER TREADS . . . a wide choice of treads suited to all types of floors, including Darnelloprene oil, water and chemical-resistant treads, make Darnell Casters and Wheels highly adapted to rough usage.

RUST-PROOFED . . . by zinc plating, Darnell Casters give longer, care-free life wherever water, steam and corroding chemicals are freely used.

LUBRICATION . . . all swivel and wheel bearings are factory packed with a high quality grease that "stands up" under attack by heat and water. Zerk fittings are provided for quick grease-gun lubrication.

STRING GUARDS . . . Even though string and ravelings may wind around the hub, these string guards insure easy rolling at all times.

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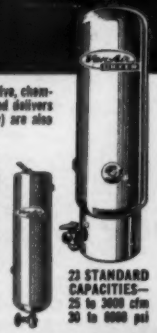
Shown above is 3000-cfm VAN-AIR Dryer—the type used by steel, automotive, chemical, container and other plants. Installed in compressor room it purifies and delivers clean, dry air to plant-wide operations. Many other capacities (see below) are also available in the complete line of VAN-AIR

COMPRESSED AIR DRYERS

THAT OPERATE FOR LESS THAN 1-CENT PER 6000 CU.FT.

The VAN-AIR Dryer is automatic. It purifies raw compressed air through a triple-action desiccator that extracts water and dirt—then reduces moisture to zero-dewpoint. It entails no heat, regeneration, volume loss or carry-over—under 1% pressure drop. The clean, dry, "instrument" quality of Van-treated air is indispensable for air controls, tools, processes, etc. as a guard against corrosion, pollution, dilution, freezing, etc.



23 STANDARD CAPACITIES—
25 to 3000 cfm
30 to 6000 psi

PATS. PEND.

Van-Air DRYER

PLANT ENGINEERS! With an eye to efficiency (cost saving, too) look into advantages of dry compressed air. Ask for brochure with dewpoint graphs.

VAN PRODUCTS CO. ★ Engineers ★ Manufacturers

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All the installation speed of Flexible Conduit . . . All the protection of Rigid Conduit . . . with

LIQUATITE®

Extruded Polyvinyl Jacket Molded to Galvanized Flexible Conduit

Complete protection against any and all contamination—impervious to water, oils, chemicals, corrosive atmospheres. Installed in minutes. No more "down-time" due to wiring shorts or burn-outs, no more periodic wiring replacements.

TYPE LT—JIC Approved

TYPE LA—Underwriters' Approved

Write for free sample, costs and name of Distributor nearest you.

ELECTRI-FLEX COMPANY

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ONLY
WATCHMASTER Automatalites
have all these advantages

Maximum Coverage · Minimum Maintenance · Consistent Dependability

★ CARPENTER COMPONENTS, exclusively, are specifically designed for emergency lighting applications . . . heavy duty, rugged, dependable

★ DOUBLE INTENSITY from large parabolic reflector lampheads . . . greater coverage from fewer units

★ FASTER RECHARGE with complete safety. Assures full protection even with several successive power failures

★ HYDROCAPS . . . proven catalytic device to reduce water loss . . . add water only every year or two . . . prevents messy corrosion . . . prolongs battery life

★ PLUS . . . U/L, city and state approvals . . . auto-timer to prevent overcharging . . . distinctive functional styling . . . completely self-contained . . . automatically activated by all types of power failures

NEVER SETTLE FOR LESS!

OVER 100 LIGHTS for every emergency need

NOW AVAILABLE:

1. Specification Sheets with complete data
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● **Explosion-Proof Lights**
● for hazardous areas where vapors, gases, or dust preclude use of standard units.
● Send for details.

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DATA FILE

(Begins on page 182)

for machinery, applied to walls and ceilings, to floors and mobile equipment. Use of color for safety purposes is also treated. Pittsburgh Plate Glass Co.

429 **Draft Starter** — Capacity data for Quickdraft units are presented in 8-pp Form QF-SD. Seven capacity tables provide means for determining capacity of standard units when installed under hundreds of different conditions. Quickdraft Co.

430 **Protective Clothing** — Catalog 12000, 12 pp, describes and illustrates company's line of industrial clothing for protection against water, fire, acids and alkalis, slipping and scuffing. Various types of work gloves, suits, and coats featured. The B. F. Goodrich Co.

431 **Reproduction Materials** — Provided in this 20-pp illustrated booklet on Kodagraph reproduction materials is a comprehensive materials selection chart designed to aid in finding material best suited to any reproduction job, from printed halftones, microfilm, and drawings with fine detail to soiled drawings and those in bad condition. Rest of booklet presents company's films, papers. Eastman Kodak Co.

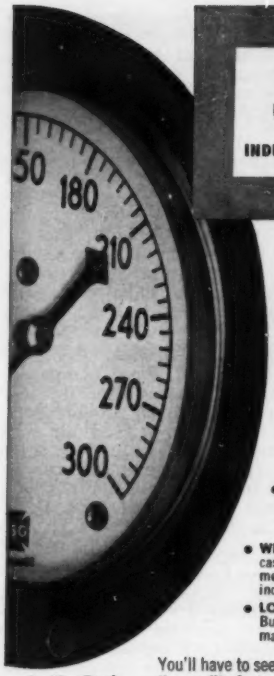
432 **Synthetic Rubber**—Applications and characteristics of Viton—a fluorocarbon elastomer—are illustrated and discussed in 8-pp Elastomer Notebook Section 81. Photos showing the materials in applications are included. E. I. du Pont de Nemours & Co., Inc.

433 **Vibratory Equipment**—Featured in this 40-pp brochure is a line of vibratory equipment, including feeders and unit vibrators. Design and construction features are illustrated and described and advantages detailed. Dimensional drawings and diagrams are included, as well as specifications and other data. Eriez Mfg. Co.

434 **Phenolic Plastics** — A primary evaluation of the properties of company's phenolics and the combinations in which they are available, in thermosetting molding materials and industrial and coating resins, is featured in this bulletin. Durez Plastics Div.. Hooker Chemical Corp.

435 **Industrial Dust Control**—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included as well as photos, cutaway views, drawings and capacity data on the various units. Pangborn Corp.

436 **Teflon Products**—Three bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Tef-



NEW

USG "A" LINE

INDUSTRIAL PRESSURE GAUGES

WHEN YOU SEE THESE GAUGES, YOU WON'T BELIEVE THE LOW PRICES!

Grade A accuracy . . . quality features at prices up to 40% below premium lines

It will pay you to check specifications of USG's new "A" Line for your plant applications—principally where steam, water and oil pressures must be indicated. Here are the highlights:

- **MEETS A.S.A. GRADE A STANDARDS**—Guaranteed accurate within 1% of scale for middle (working) half of scale—1½% for remainder.
- **WIDE CHOICE OF OPTIONS** — Variety of cases (aluminum standard), mountings, movements, Bourdon tubes . . . dial sizes 3½ to 12 inches . . . pressures to 10,000 psi.
- **LONG LIFE AND EASY MAINTENANCE**—Built-in features and rugged construction assure maximum life with minimum maintenance.

Find Your Nearest Distributor in the "Yellow Pages"

You'll have to see the new "A" Line gauges to believe all the quality features and options offered at amazingly low costs. Ask your U.S. Gauge distributor for a demonstration today, or write for a copy of new Catalog 305.

UNITED STATES GAUGE

DIVISION OF AMERICAN MACHINE AND METALS, INC., SELLERSVILLE, PA.

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If you burn coal

OXI CRYSTALS

will increase boiler efficiency!

By adding OXI Crystals you get more heat and steam with less fuel, minimize smoke, insure full boiler output at all times, completely oxidize all combustible deposits from firedoor to the top of the stack . . . all this with very little labor involved.

OXI Crystals will also get rid of slag, firescale, encrusted carbon and soot in your boiler . . . *fast!*

We are so confident that OXI will satisfy you we offer it under an iron-clad guarantee.

Learn more about this amazing product. Write today for full information

Also ask about KOR, the perfect *fuel oil conditioner* . . . and SURFBLOW, the *floating boiler water skimmer.*

OXI CORPORATION

71 — BOX 485

GARY, INDIANA

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WEATHERPROOF SKY-BLAST®

POWER ROOF VENTILATORS ELIMINATE MAINTENANCE

Sky-Blast weatherproof design is strictly functional and maintenance-free! This powerful industrial ventilator helps preserve roofs too, by shooting heat, fumes and oily mist high into air so they can't turn downward!

All-welded base of heavy gage steel is hot-dip galvanized *after fabrication* . . . has no seams that can open up or rust through. Fully enclosed weatherized R&M motor is completely protected against rust and corrosion. Rigid one-piece cast aluminum magnesium alloy airfoil propeller operates continuously without failure from bending fatigue. Reinforced damper blades won't stick . . . feature self-lubricating bronze bearings. Patented non-clogging rainshed design eliminates troublesome conventional drain trough. Deep inner throat drains condensate onto roof, not into building.

Sizes from 16" to 60" for 2820 to 78,800 CFM—PFMA Certified Ratings. Available with new patented Smoke-Trip® thermally actuated emergency damper release for fire protection.

WRITE TODAY FOR BULLETIN NO. 680-PE

R&M PROPELLAIR®

DIV. OF ROBBINS & MYERS, INC.
SPRINGFIELD, OHIO

Certified Ratings PFMA

DIRECT CONNECTED | VANEAXIAL | TUBEAXIAL | CENTRIFUGAL

MOVING AIR IS OUR BUSINESS®

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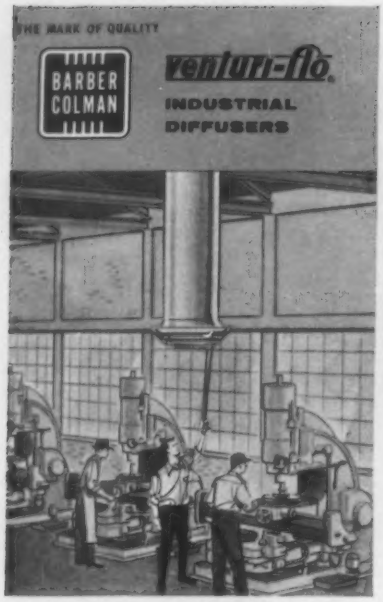
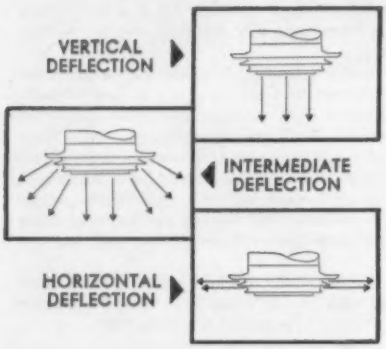


Fresh air at working level improves employee efficency

Barber-Colman Model BP Venturi-Flo industrial diffusers permit air to be piped down to working level. This prevents stagnant, smoky air which has collected near the roof, from being mixed with the incoming fresh air. The contaminated air is readily expelled by roof exhaust fans. Employee comfort and efficiency are measurably improved.

The Venturi-Flo industrial diffuser can be adjusted easily from the floor to deliver any air pattern. In warm weather, the air should be delivered close to, or even directly at, the worker; while



during cool evenings, or in cold weather, the air should be diffused above the head of the worker, providing adequate ventilation, but eliminating cold drafts.

A complete range of sizes is available to meet any industrial requirement. Get complete information in Bulletin F7722-1 — performance data, installation diagrams, and dimensions. Call your Barber-Colman field office or write:

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DATA FILE

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lon impregnated asbestos packing, V-type packing and Teflon seal cage —for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts available. Chemical & Power Products, Inc.

437 **Compressed Air Dryer** — Featured in 12-pp Catalog D2-858NE5 is a dryer designed to provide dry, clean, safe compressed air for a variety of industrial uses. Describes features and operation, and includes dewpoint graphs, operating capacities and sizing graphs ,and specifications. Van Products Co.

438 **Insulation Specifications**—This set of six specifications covers applications of Foamglas insulation for industrial equipment and piping. Each booklet contains tables of suggested thicknesses of insulation to be applied, drawings of installation procedure, supports, and recommended finishes. Booklets are devoted to low-, medium-, high-, and dual-temperature equipment and piping, to underground piping, and spheres. Pittsburgh Corning Corp.

439 **Chemical Products**—This 8-pp industrial catalog describes production and maintenance chemicals, including sealing compounds, cements, oils and lubricants, hydraulic fluids, service products, and others. Table lists recommended sealants for specific applications. Permatex Co., Inc.

440 **Preheating Combustion Air** — This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels effectively. Air Preheater Corp.

441 **Cyclone Separators**—Featured in 8-pp Bulletin 712 are company's cyclone separators and pipe line after-coolers designed to provide cool, dry and clean compressed air and gases. Cutaway views illustrate component parts and features, and capacity tables facilitate selection. Typical installations are also pictured. R. P. Adams Co., Inc.

442 **Insect Control**—Featuring manufacturer's insecticides and insect control equipment, this practical 36-pp booklet provides excellent tips on the control of industrial insects. More than 60 pests are pictured along with specific information on where they are found, identifying features, extent of damage, life stages and cycles, characteristics of existence, and recommended control measures. Ten insecticides are covered in detail. West Chemical Products, Inc.

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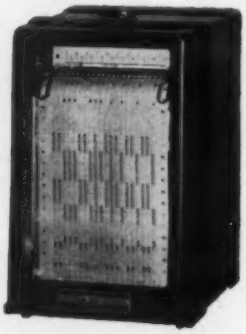

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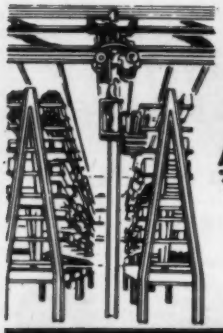

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the downturn

and upturn at KVP

Same picture – different setting. Top shows complicated, space-wasting duct system which routed fumes back into plant for discharge through stacks. Bottom shows nine new 36" Aerovent "SP-7" Duct Fans installed to take fumes *up* and *out*, saving valuable floor space in busy working area. Just one of hundreds of successful Aerovent installations characterizing modern air engineering in action.

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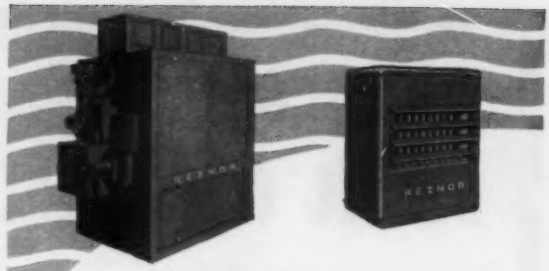

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It costs you next to nothing to maintain your heating system when you have Reznor gas heaters. A few minutes per heater once a year for motor lubrication should be your total maintenance time. And no skilled labor is required. Heater failures? Simple, fool-proof design and quality construction make them a rarity.

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Look for Reznor Under "Heaters-Unit" in the Yellow Pages

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WORLD'S LARGEST SELLING DIRECT-FIRED

UNIT HEATERS

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FOUR SIZES • ¾, 1½, 3 and 6 Tons

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- Load brake is dependable and safe
- Weights:

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1½-TON, 23½ lbs.
3-TON, 36½ lbs.
6-TON, 63 lbs.

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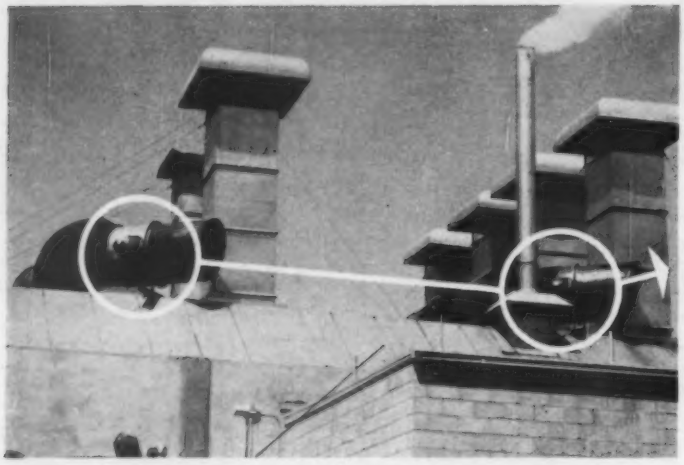
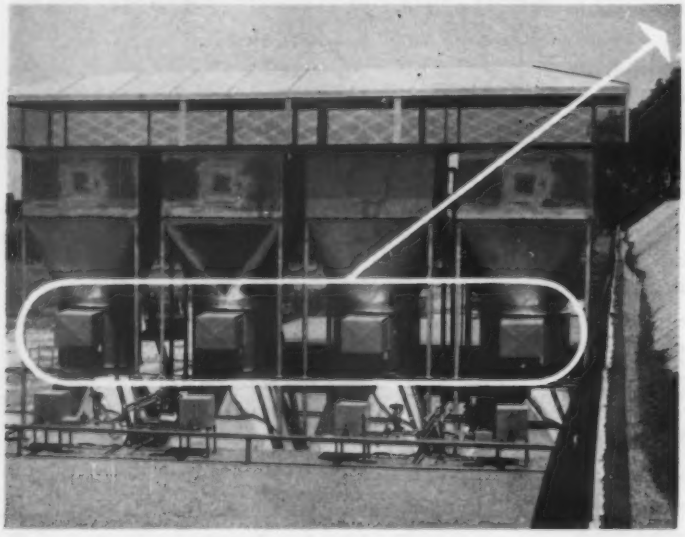
Hartzell belt-drive duct fans withstand heat and moisture

to keep production lines rolling at California Vegetable Concentrates, Inc.





The fan or blower which does an adequate job under routine operating conditions won't necessarily stand up when the going gets tough. Hartzell air moving equipment is designed and built with a plus capacity that allows it to take rough jobs in stride.

Typical of the unusual jobs which are a natural for Hartzell fans and blowers are these installations at California Vegetable Concentrates, Inc., Modesto, Cal. The top photo shows two of the five 44″, 3 h.p. Hartzell belt-drive duct fans which exhaust 26,200 cfm of hot, wet air from a belt-type continuous vegetable dehydrator.

The lower photo shows four 48″, 10 h.p. Hartzell belt-drive duct fans which supply heated air for a tunnel-type dryer. Each of these fans moves 30,800 cfm thru a gas fired heater (shown at the top of the stack). These fans are exposed not only to the high temperature of the entering air but to extreme radiant heat from the burners themselves.

Fan failure here would cripple the entire operation, but the customer reports that in 15 months of operation these fans have required only a minimum of routine maintenance. No damage due to heat or moisture has yet been detected.

For specific recommendations on how rugged, reliable Hartzell fans and blowers can help you solve your air moving problems, get in touch with your nearby Hartzell field engineer. If you don't know him, drop us a line for his name and address.

These installations were handled by the Hartzell field office at Santa Clara, California; P. O. Box 144, phone Cherry 3-3217.

here's a complete line of air moving equipment designed and built specifically for industry

Propeller Fans • Duct Fans • Vaneaxial Blowers • Man Coolers • Centrifugal Blowers • Roof Ventilators • Adjustable Pitch Fans • Intake Units

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Division of Castle Hills Corporation

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Engineering Offices in Principal Cities

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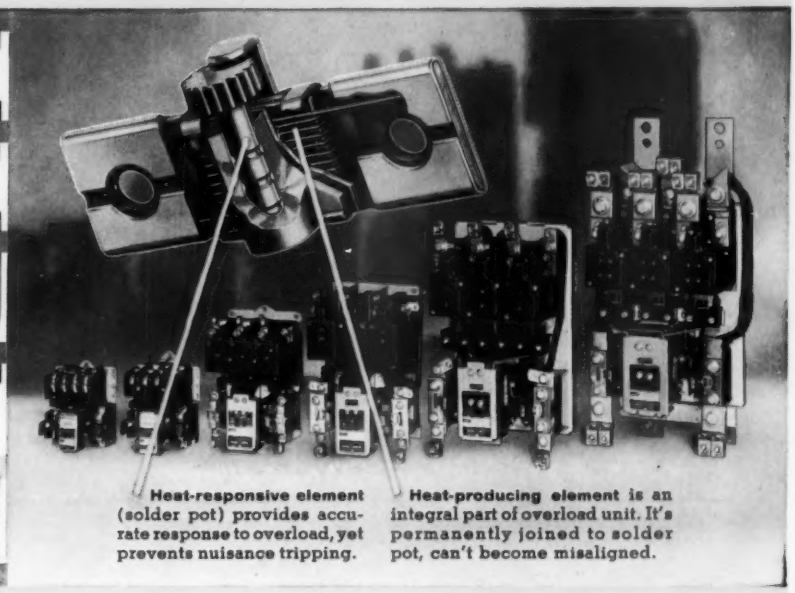
YOU PAY FOR OVERLOAD PROTECTION

BE SURE YOU GET IT!



Heat-responsive element (solder pot) provides accurate response to overload, yet prevents nuisance tripping.

Heat-producing element is an integral part of overload unit. It's permanently joined to solder pot, can't become misaligned.

Only ONE-PIECE Overload Relays can give 100% Protection Only with ONE-PIECE construction can you *know* you've installed the heater correctly. Only with ONE-PIECE construction can you *know* the heater is exactly centered, or properly positioned, so that it performs according to its rating. Only with ONE-PIECE construction can you *know* your starters will not operate without the thermal units properly installed. Only with ONE-PIECE construction can you *know* your motors have full protection.

Only Square D has ONE-PIECE Construction ONE-PIECE construction *eliminates* any possibility of heater misalignment. Square D melting alloy thermal overload relays can be installed only one way. They are tamper-proof. They are factory-assembled, are *individually* calibrated and tested. Repeated tripping will not affect their accuracy.

Insist on Square D starters with melting alloy thermal overload relays

LET US PROVE IT!

Let your Square D Field Engineer show you 1 how one-piece construction is accomplished and how easy it is to mismatch separate heaters and solder pots— 2 an endurance tester to prove that overload units can be reset repeatedly without damage while the solder is liquid— 3 a tripping time tester to compare various types of melting alloy units and to prove that tripping time won't change after repeated operation.

Write for Bulletin SM-275 for the complete story on Square D starters with ONE-PIECE thermal overload relays. Address Square D Company, 4041 N. Richards St., Milwaukee 12, Wisconsin

SQUARE D COMPANY

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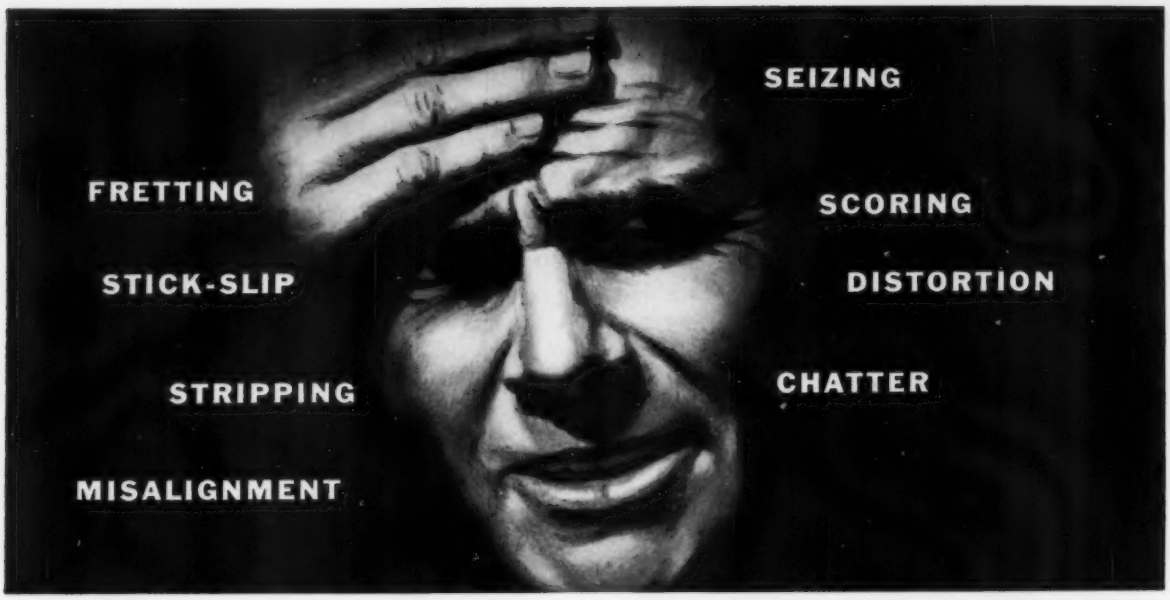

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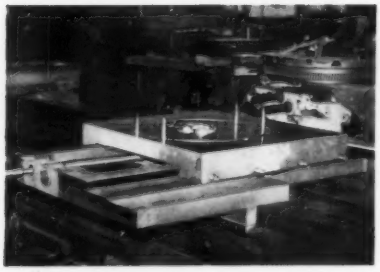
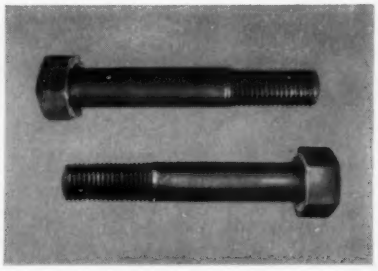
Order a pound of Molysulfide, in either powder or concentrated grease form, from any one of the manufacturers below.



No slip-stick action at low speeds on machine tools gibs and ways when they're greased occasionally with Molysulfide heavy-duty lubricant.



No seizing. Service dismantling of power-house generator reveals bolts in top condition 21 months after Molysulfide lubrication.

Press fitting without galling. Both assembly and disassembly of locomotive drive journal go smoothly when Molysulfide lubricant is used.

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